2003-08-18

Property Value Assessment and the Irish EIA Process

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B. Sc. (Surv.)

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Submitted in accordance with the requirements for the M. Phil

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August 2003

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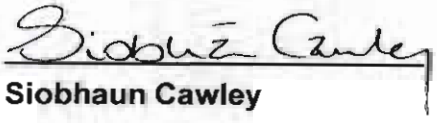
Signed: 

Siobhaun Cawley

Date: 18th August 2003

ACKNOWLEDGEMENTS

I am greatly indebted to the following people for their invaluable assistance in the course of this study.

To my supervisor, Gerry Walker, for his support, encouragement and valuable guidance.

To Mr. Eoghan Brangan, Senior Planning Adviser, Department of the Environment, for his assistance and the insight he provided into the EIA process in Ireland.

Too numerous to name individually, to those involved in the EIA process, in both public and private capacities, in Ireland, the UK, The Netherlands, the USA, Canada and Australia who assisted the author in her research into the EIA process in Ireland and elsewhere.

To the numerous individuals who kindly provided the necessary data for the Fruit of the Loom case study in Buncrana, Co. Donegal; the case study on the Navan Road Improvement Scheme, Co. Dublin; the Ballydonagh landfill site case study in Co. Westmeath; and the Donohill landfill site case study in Co. Tipperary.

To Joe Davis and the staff of the Department of Building & Surveying in D.I.T., Bolton Street, for their advice.

Finally, to my husband John, who in numerous ways gave me the essential support to complete this thesis.

ABSTRACT

Thesis Title:

Property Value Assessment and the Irish EIA Process.

Environmental Impact Assessment (EIA) provides for the assessment of the likely significant effects of a proposed development on the environment. Due to the ambiguous nature of the legislation on EIA, there are widely differing views as to whether the impact of a proposed development on surrounding property values should be considered as part of the EIA process. The primary objective of the thesis was to establish if property values should be considered within the Irish EIA process. In this regard, the relevant provisions of EC Directive 97/11/EC and the corresponding Irish legislation (Part X of the Planning & Development Act 2000 and Part 10 of the Planning & Development Regulations 2001) were reviewed and it was established how these legislative provisions were being interpreted in practice. This was achieved by means of interviews with key personnel in the Irish EIA process and through a review of all of the Environmental Impact Statements submitted to 'competent authorities' in Ireland over a ten year period. The thesis concludes that 'impacts on property values' are economic impacts upon "human beings" and "material assets" i.e. land and/ or property, and as such, they should be considered in the Irish EIA process, but only in instances where the potential impact of the proposed development on property values is likely to be significant.

The secondary objective of the thesis was to establish if it was possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process. Three quantitative methods were identified that have been used for property value assessment in countries such as the UK, the USA, Canada and Australia. The methods were the hedonic pricing method, the 'before and after' study method and the benefits/ costs transfer method. These methods have been applied to a limited extent in EIA world-wide. The study explores, through the use of case studies, the practical application of the three quantitative methods to property value assessment in the Irish EIA process. However, the thesis concludes that there are a number of inherent problems which need to be overcome in formulating and testing a quantitative approach and methodology for the assessment of the potential impact of a proposed development on property values. The main problem is the lack of public access to accurate and detailed information on both property transactions and environmental considerations.

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LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
ACORN	A Classification of Residential Neighbourhoods
ANEF	Australian Noise Exposure Forecast
CBA	Cost-Benefit Analysis
CIE	Corás Iompair Éireann
CNR	Composite Noise Rating
Co. Co.	County Council
CSO	Central Statistics Office
dB(A)	Decibel
Dev.	Deviation
DIT	Dublin Institute of Technology
EC	European Community
EEC	European Economic Community
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERU	Environmental Research Unit
EU	European Union
GIS	Geographic Information System
HGV	Heavy Goods Vehicle
IDA	Industrial Development Authority
Ltd.	Limited
NEF	Noise Exposure Forecast
NEPA	National Environmental Policy Act
NNI	Noise and Number Index
No.	Number
PC	Parliamentary Class
PER	Public Environment Report
plc	Public Limited Company
Sq. M.	Square Metres
UDC	Urban District Council
UK	United Kingdom
US	United States
USA	United States of America

CHAPTER ONE

Introduction

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

In recent years, there has been growing public awareness with regard to environmental issues, allied with increased public participation in the development control process. Concerns are regularly expressed about the possible effects which proposed developments may have on the surrounding environment. The possible devaluation of land and property in the vicinity of a proposed development is one such concern that is regularly voiced. Property constitutes a substantial asset, and is often the largest investment that people make in their lifetime. In this regard, where a proposed development has the potential to affect property values, it is a very sensitive, and often emotive, issue.

In Ireland, the potential impact of a proposed development on surrounding property values is regarded as a material planning consideration. This is evidenced by the fact that the depreciation of the value of property in the vicinity of a proposed development is listed as a non-compensatory reason for the refusal of planning permission[1] in the Fourth Schedule of the Planning & Development Act 2000 and, in practice, planners often quote this reason as grounds for the refusal of planning permission.

Where an application for planning permission is being made in respect of a development that is required to be subjected to Environmental Impact Assessment (EIA), an Environmental Impact Statement (EIS) must accompany the planning application. Also, local authorities are required to prepare an EIS if they propose to undertake a development which, by law, is required to be subjected to EIA. In both instances, the EIS must include the

[1] Reason 10(c) of the Fourth Schedule of the Planning & Development Act 2000.

data necessary to identify and assess the effects which the proposed development is likely to have on the environment. The EIS must be taken into consideration in the decision-making process.

1.2 THE IMPETUS FOR THE STUDY

The impetus for this study came from the Environmental Research Unit[2] (within the Department of the Environment and Local Government) who considered that the assessment of the possible effects of major developments on property was a subject which was either being omitted, or unsatisfactorily treated, in Environmental Impact Statements being submitted in Ireland. They suggested that the study could focus on the identification of the shortcomings of the treatment of property in the Irish EIA process, with a view to establishing an approach and methodology that could be adopted in future EIA's. A copy of the letter from the Environmental Research Unit (ERU) to Mr. Gerry Walker, Dublin Institute of Technology (DIT), Bolton Street, in relation to the above is attached at Appendix 1. Emanating from the above suggestion, the working title for the study which DIT provided the author with was "to devise a quantitative methodology to assess the impact of major developments on surrounding property values as part of Environmental Impact Statements".

However, as the author's research progressed, it became apparent that there were widely differing views as to whether property values should be considered in the EIA process. This is primarily due to the fact that the EC Directive on EIA and the corresponding Irish legislation do not provide a clear direction on this matter. In light of this, it became evident that the primary question that needed to be asked was not how property values should be dealt with in the EIA process, but whether property values should be considered in the EIA process at all. The author changed the focus of the study to reflect this.

[2] The Environmental Research Unit has since ceased to exist and its role and functions have been subsumed within the Planning & Development Section of the Department of the Environment.

1.3 OBJECTIVES

1.3.1 Primary Objective of the Thesis

The primary objective of this thesis is to establish whether the potential impacts of proposed developments on surrounding property values should be considered in the Irish EIA process. In this respect, the following research question was posed:

Should property values be considered in the Irish EIA process?

At this stage, it is appropriate to point out that this thesis is solely concerned with the impact of proposed developments on the value of land and property located in the vicinity of the proposed development, and not with land and property which is to be compulsorily acquired, either in whole or in part, or to be affected by a wayleave, in connection with the proposed development. In such instances, Irish legislation provides for the payment of compensation to the landowner/ occupier in question, and as such, this topic is considered outside the scope of this study.

1.3.2 Secondary Objective of the Thesis

The secondary objective of this thesis is dependent on the answer to the first research question posed. If the answer to the research question is affirmative, then the secondary objective of this thesis is to establish whether it is possible to devise a suitable quantitative methodology for carrying out property value assessment within the Irish EIA system. In this respect, the following research question was posed:

Is it possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process?

1.4 Approach & Methods Employed

1.4.1 Approach

In this thesis, the author adopted the following approach:

- To review current literature on the subject.
- To review pertinent EU and Irish legislation.
- To establish the views of key personnel involved in the Irish EIA process by means of interviews.
- To examine current practice in Ireland by means of interviews and a review of the EIS's submitted in Ireland over a ten year period.
- To examine how property value assessment is dealt with within the EIA process in various countries world-wide, with a view to establishing if quantitative approaches have been employed.
- To undertake a number of case studies to ascertain whether a quantitative methodology for carrying out property value assessment could be applied in an Irish context.

1.4.2 Methods Employed

1.4.2.1 Literature Review

As there is very little literature available on the subject of property values and the EIA process, this thesis does not contain a structured literature review. Wherever literature does exist on a particular aspect of the study, reference is made to it where appropriate.

1.4.2.2 Review of Pertinent EU & Irish Legislation

The relevant provisions of EC Directive 97/11/EC and the corresponding Irish legislation (Part X of the Planning & Development Act 2000 and Part 10 of the Planning & Development Regulations 2001) were reviewed. The pertinent sections of the National Guidelines on Information to be Contained in Environmental Impact Statements and the accompanying Advice Notes, which were prepared by the Environmental Protection Agency (EPA), were also reviewed.

1.4.2.3 Interviews

The Department of the Environment and Local Government, the Environmental Protection Agency, An Bord Pleanála and a number of planning authorities, EIA consultants and developers in Ireland were requested to partake in an interview for the purposes of this study. Details are as follows:

Department of the Environment and Local Government

The author interviewed Mr. Eoghan Brangan, Senior Planning Adviser (since retired) and Mr. Enda Casey, Higher Executive Officer, in the Planning & Development Section of the Department of the Environment and Local Government.

Environmental Protection Agency

The author interviewed Dr. Gerry Byrne of the Environmental Protection Agency, the Project Co-Ordinator for the National Guidelines on Information to be Contained in Environmental Impact Statements and the accompanying Advice Notes and Mr. Conor Skehan, Director of CAAS Environmental Services Limited, the consultants who were responsible for preparing the National Guidelines and Advice Notes on behalf of the EPA.

An Bord Pleanála

The author contacted senior planning inspectors within An Bord Pleanála, but they declined to be interviewed.

Planning Authorities

As there are 89 Planning Authorities in the Republic of Ireland, a sample of 9 planning authorities (10%) was selected for interview purposes. The author decided to include the four planning authorities responsible for the Dublin City and County area in this sample, due to the fact that nearly 20%[3] of the EIS's

[3] Based on the author's research, of the 762 EIS's submitted to 'competent authorities' in Ireland during a ten year review period, a total of 140 EIS's (18.4%) were submitted to the four Dublin planning authorities

submitted in Ireland are submitted to one of these four planning authorities. Of the 9 Planning Authorities contacted by the author, 7 agreed to be interviewed for the purposes of this study. The 7 planning authorities that were interviewed are as follows:

- Donegal County Council
- Dublin City Council
- Dun Laoghaire/ Rathdown County Council
- Galway City Council
- Limerick City Council
- South Dublin County Council
- Waterford City Council.

Please note that the view of each planning authority as expressed in this thesis is the consensus view of the senior planners within that planning authority as opposed to the official view of the planning authority.

EIA Consultants

Of the 5 EIA Consultants contacted by the author, 3 agreed to be interviewed for the purposes of this study. The EIA Consultants that were interviewed are as follows:

- Mr. Conor Skehan, Director of CAAS Environmental Services Limited.
- Dr. Brian Meehan of Brian Meehan & Associates, Chartered Town Planners. Dr. Brian Meehan was a contributor to the EPA's National Guidelines.
- Ms. Aoife Cassidy, Director of Tiros Resources Limited (formerly part of Frank L. Benson & Associates, Chartered Town Planners).

Unfortunately, Mr. Jonathan Blackwell of Blackwell & Associates (whose written work is quoted in this study) had moved out of the country, and so was unavailable for interview.

i.e. Dublin City Council, Dun Laoghaire/ Rathdown County Council; Fingal County Council and South Dublin County Council.

Developers

Three developers, all of whom have been responsible for major development projects in Ireland in recent years, were interviewed for the purposes of this study. The developers that were interviewed are as follows:

- Dublin City Council, a public sector developer, who are responsible for the development of the Dublin Port Tunnel (on behalf of the National Roads Authority), which is currently under construction in Dublin City. The author interviewed Mr. Rory Deegan, a Deputy Planning Officer with Dublin City Council, who was involved in the Dublin Port Tunnel Project.
- Corás Iompair Éireann (CIE), a semi-state body, who are responsible for the development of the LUAS light rail system, which is currently under construction in Dublin City. The Property Department of CIE were responsible for compiling the sections of the LUAS EIS which dealt with land use and property-related matters. In this regard, the author interviewed Ms. Lisa Mackey, a Chartered General Practice Surveyor, from the Property Department.
- Green Property plc, a publicly quoted property development and investment company, who were responsible for the development of The Blanchardstown Centre, Dublin, from the mid-1990's onwards. The Blanchardstown Centre is one of Ireland's largest shopping centre and retail warehousing developments. The author interviewed Mr. Conor Byrne, a Development Surveyor within the company.

1.4.2.4 Review of Environmental Impact Statements

Review of EIS's Submitted in Ireland over a Ten Year Period

The author reviewed the 762 EIS's that were submitted to 'competent authorities' in the Republic of Ireland over a ten year period (between 3rd July 1988[4] and 31st December 1997). The Department of the Environment and Local Government has collected copies of the EIS's submitted in Ireland since the 3rd July 1988 and made them available for consultation and research in ENFO, the public environmental information service. To date, the Department

[4] The requirements of EEC Directive 85/337/EEC on EIA came into effect in Ireland on 3rd July 1988.

of the Environment and Local Government have published seven inventories of EIS's which contain reference information on the EIS's submitted between the 3rd July 1988 and 31st December 1996. The information in the EIS inventories is based on returns from all competent authorities, supplemented by information obtained from the main consultants engaged in preparing the EIS's and from public sector developers, including all Government departments. At the time of writing, ENFO are in the process of preparing an inventory of all EIS's that have been submitted in Ireland since 1997, and they propose to make this available to the public in the near future. Mr. Eoghan Brangan, a Senior Planning Adviser in the Department of the Environment and Local Government, provided the author with the relevant information for the EIS's submitted during 1997. However, as the information was not available for the full complement of EIS's submitted to 'competent authorities' during the subsequent years, the author decided to use the 31st December 1997 as the cut-off date for the review period.

The purpose of the review of EIS's submitted to 'competent authorities' in Ireland between 1988 and 1997 was threefold, namely:

- To assess how many EIS's considered the potential impact of the proposed development on land and property values;
- To establish what aspect of the environment 'impacts on property values' were considered under; and
- To examine the methodologies used for the assessment of 'impacts on property values'.

Review of EIS's Submitted in Other Countries

The author visited the Environmental Impact Assessment Centre at the University of Manchester, UK, and reviewed the extensive sample of EIS's, from countries such as the UK, the USA, Canada, Australia, The Netherlands, Italy, Spain and other European countries, that are held there. With the exception of The Netherlands, the review of EIS's submitted in other European countries was limited due to the fact that only a small number of them had been translated into English. The author also contacted a number

of personnel involved in the EIA process in the UK, The Netherlands, the USA, Canada and Australia with a view to establishing how property value assessment was dealt with in the EIS's that were submitted in these countries. These five countries were selected for the following reasons:

- The EIA systems in the USA, Canada, Australia and The Netherlands are generally regarded as being the most well-developed and progressive in the world[5], and therefore, it was probable that if quantitative approaches to property value assessment were being employed in EIA, that they were being used in these countries.
- A literature search revealed that the majority of property value studies that had been undertaken world-wide (not necessarily as part of EIA) had been carried out in the USA, Canada, Australia and the UK.

1.4.2.5 Case Studies

Four case studies were undertaken to test the practical application of various quantitative approaches to property value assessment within the Irish EIA process.

1.5 The Structure of the Thesis

The thesis is broadly divided into two main sections. The first section explores the issue of whether property values should be considered in the EIA process and the second section examines the various approaches that have been taken to property value assessment within EIA, with a view to ascertaining whether it is possible to devise a suitable quantitative methodology for carrying out property value assessment within the Irish EIA system.

The first section, which comprises chapters two and three, deals with the first research question that was posed i.e. should property values be considered in the EIA process? In this regard, chapter two examines the relevant provisions of EC Directive 97/11/EC and the corresponding Irish legislation on EIA and

[5] Barrow, C. J. (1997), *Environmental and Social Impact Assessment – An Introduction*, Arnold, UK, p. 170.

ascertains how these provisions have been interpreted in practice. Chapter three explores the concept of significance and examines how significance in relation to impacts on property values is determined in the Irish EIA system.

The second section, which comprises chapters four, five and six, deals with the second research question that was posed i.e. is it possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process? In this regard, chapter four examines the various approaches and methodologies that have been employed in Irish EIS's and in EIS's undertaken in the UK, The Netherlands, the USA, Canada and Australia for the assessment of the potential impacts of a proposed development on property values. Chapter five provides a detailed examination of three quantitative approaches that have been used world-wide for property value assessment, although not exclusively in EIA. Chapter six explores the practical application, through the use of case studies, of the quantitative approaches detailed in chapter five to the Irish EIA system.

Finally, the main conclusions and recommendations of the thesis are summarised.

CHAPTER TWO

Should Property Values be Considered in the EIA Process?

CHAPTER TWO

SHOULD PROPERTY VALUES BE CONSIDERED IN THE EIA PROCESS?

2.1 INTRODUCTION

This chapter examines the issue of whether property values should be considered in the EIA process. Impacts on property values are Economic Impacts. As EIA provides for the assessment of the likely significant effects of a proposed development on the *environment*, it is not immediately apparent whether economic impacts should be included in the assessment. In order to establish whether property values should be considered in the EIA process, this chapter examines the relevant legislative provisions, the current literature on the subject and the views of practitioners involved in the Irish EIA system.

2.2 ENVIRONMENTAL IMPACT ASSESSMENT

Environmental Impact Assessment (EIA) may be defined as the systematic examination of the likely impacts of development proposals on the environment prior to the initiation of any activity[1]. EIA, as applied in its broadest sense, involves identifying actions which require EIA (known as screening); identifying the key issues that should be addressed in the EIA (scoping); reviewing the existing state of the environment and the characteristics of the proposed action (and possibly alternative actions); predicting the impacts of the action on the environment; considering methods for reducing or eliminating any negative impacts; preparing an Environmental Impact Statement (EIS) for submission to the relevant decision-maker; and after a decision is made about whether the action should proceed, possibly monitoring the actual impacts of the action. The

[1] Definition provided in Bradley, M. D. K. (1991), Introduction & Overview, In Bradley, K., Skehan, C. & Walsh, G. (eds), *Environmental Impact Assessment A Technical Approach*, DTPS Ltd. Environmental Publications, Dublin, p. 1.

formal development of EIA began in the United States in 1970 with the implementation of the National Environmental Policy Act of 1969 (NEPA).

Within the European Union, EIA is required for certain development projects under the terms of EC Directive 97/11/EC (which amends EEC Directive 85/337/EEC) on the Assessment of the Effects of Certain Public and Private Projects on the Environment. These Directives required all Member States to adopt measures to ensure that projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects. A further requirement is that the result of consultations and information gathered pursuant to the EIA process is to be taken into consideration in the development consent procedure.

The types of development projects that are currently required to be subjected to EIA under European law are listed in Annex I and II of EC Directive 97/11/EC. EIA is mandatory for all of the development projects listed in Annex 1, whereas Member States have discretion in relation to determining when the development projects listed in Annex II should be subjected to EIA. They may do this on a case-by-case basis and/ or by establishing thresholds or criteria.

2.3 IRISH LEGISLATION ON EIA

2.3.1 Previous & Current Legislation

The requirements of EEC Directive 85/337/EEC (and the amending EC Directive 97/11/EC) were implemented into Irish law by integrating them into the land-use planning consent system and other development consent systems[2]. This was achieved through the introduction of a number of statutory regulations such as the European Communities (Environmental Impact Assessment) Regulations 1989 (as amended) and the Local Government (Planning & Development) Regulations 1990 (as amended).

[2] These include development consent systems for foreshore development, roads/ motorway construction, light rail systems and the laying of oil and gas pipelines.

However, all of the legislation and regulations governing planning and EIA were revoked when the relevant parts[3] of the Planning & Development Act 2000 and the Planning and Development Regulations 2001 were introduced on the 11th March 2002. The provisions in relation to EIA are contained in Part X of the Planning and Development Act 2000 and Part 10 of the Planning and Development Regulations 2001. The introduction of this legislation heralded the first time that EIA was given a basis in primary legislation in Ireland.

2.3.2 Projects which Require EIA

S. 172 of the Planning & Development Act 2000 provides that where a planning application is being made in respect of certain types of development, that an Environmental Impact Statement (EIS) must accompany the planning application. S. 175 of the same Act provides that local authorities must prepare an EIS for certain types of development that are proposed to be carried out either by themselves or on their behalf. In relation to both of these provisions, the types of development that are considered likely to have significant effects on the environment and which require an EIS are listed in Parts I and II of Schedule 5[4] of the Planning & Development Regulations 2001.

2.3.3 Information to be Contained in an EIS

The information that developers (both private and public) are required to provide in an Environmental Impact Statement is set out in Article 94 and Schedule 6 of the Planning & Development Regulations, 2001.

Article 94 of the Planning & Development Regulations 2001 states that -
An EIS shall contain –

(a) the information specified in Paragraph 1 of Schedule 6,

(b) the information specified in Paragraph 2 of Schedule 6 to the extent that –

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3 The provisions of the Planning & Development Act 2000 and the Planning & Development Regulations 2001 were introduced piecemeal.

4 Parts I & II of Schedule 5 correspond to Annex I and II of EC Directive 97/11/EC.

(i) such information is relevant to a given stage of the consent procedure and to the specific characteristics of the development or type of development concerned and of the environmental features likely to be affected, and

(ii) the person or persons preparing the EIS may reasonably be required to compile such information having regard, among other things, to current knowledge and methods of assessment, and

(c) a summary in non-technical language of the information required under paragraphs (a) and (b).

The information to be contained in an EIS as per Paragraphs 1 and 2 of Schedule 6 of the Planning & Development Regulations 2001 is detailed in Table 2.1 on Page 15.

For the purposes of this study, the relevant sections of Schedule 6 are Part (c) of Paragraph 1 and Parts (b) and (c) of Paragraph 2. These will be referred to where appropriate throughout the course of this study.

Table 2.1: Schedule 6 – Information to be Contained in an EIS

1. (a) A description of the proposed development comprising information on the site, design and size of the proposed development.
   (b) A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects.
   (c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment.
   (d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment.

2. Further information, by way of explanation or amplification of the information referred to in Paragraph 1, on the following matters:-
   (a)
   (i) A description of the physical characteristics of the whole proposed development and the land-use requirements during the construction and operational phases;
   (ii) A description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;
   (iii) An estimate, by type and quantity, of expected residues and emissions (including water, air and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development;

   (b) A description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:
   - human beings, fauna and flora,
   - soil, water, air, climatic factors and the landscape,
   - material assets, including the architectural and archaeological heritage, and the cultural heritage,
   - the inter-relationship between the above factors;

   (c) A description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from:
   - the existence of the proposed development,
   - the use of natural resources,
   - the emission of pollutants, the creation of nuisances and the elimination of waste,
   - and a description of the forecasting methods used to assess the effects on the environment;

   (d) An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.

Source: Schedule 6 of the Planning & Development Regulations 2001.

2.4 IRISH GUIDELINES & EC GUIDANCE DOCUMENTS ON EIA

2.4.1 National Guidelines on Information to be Contained in EIS's

The Environmental Protection Agency Act 1992[5] empowered the Environmental Protection Agency (EPA) to prepare national guidelines on the information to be contained in environmental impact statements. The Act further provides that those preparing and evaluating EIS's *must* have regard to the Guidelines as they provide an agreed basis for determining the adequacy of the issues addressed and the methodologies employed in EIS's.

In 1995, the EPA published draft Guidelines on the Information to be Contained in Environmental Impact Statements[6] and Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)[7]. The final version of the Guidelines on Information to be Contained in Environmental Impact Statements[8] was published in 2002. The Advice Notes[9] were revised in 2000 and they are currently under revision again. At the time of writing, the EPA have advised that the final version of the Advice Notes is due to be published in 2003.

As part of the Advice Notes to the Guidelines on Information to be Contained in EIS's, the EPA provide guidance on the topics which would usually be addressed when preparing an Environmental Impact Statement for developments of a particular project class. For ease of reference, the EPA have condensed the 134 project types listed in Schedule 5 of the Planning & Development Regulations 2001 into 32 Project Types. The Project Types comprise a number of related generic development types with similar development and/ or operational characteristics.

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5 Section 72 of the Environmental Protection Agency Act 1992.

6 Environmental Protection Agency (1995), *Draft Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Publications, Dublin.

7 Environmental Protection Agency (1995), *Advice Notes on Current Practice (in the Preparation of Environmental Impact Statements)*, Environmental Publications, Dublin.

8 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

9 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

2.4.2 EC Guidance Documents on EIA

In June 2001, the European Commission published three Guidance Documents on EIA, namely:

- Guidance on EIA - Screening
- Guidance on EIA - Scoping
- Guidance on EIA - EIS Review.

As a preamble to each of the Guidance Documents, the EC state that they reflect EU legislation and the current state of good practice (drawn from experience from around Europe and worldwide).

Both the Irish Guidelines and the Advice Notes and the EC Guidance Documents on EIA are referred to where relevant throughout the course of this study.

The remainder of this chapter examines the issue of whether the potential impact of a proposed development on property values should be considered in the EIA process.

2.5 CONSIDERATION OF 'IMPACTS ON PROPERTY VALUES' IN EIA

2.5.1 Socio-Economic Impacts & the EIA Process

Impacts on property values are generally regarded as Economic Impacts. Within the literature on EIA, they are usually grouped together with Social Impacts and collectively, they are known as Socio-Economic Impacts. As EIA provides for the assessment of the likely significant effects of a proposed development on the *environment*, it is not immediately apparent whether socio-economic impacts should be included in the assessment. Opinions vary on the issue of whether socio-economic impacts should be considered in the EIA process. Some commentators regard socio-economic impact assessment as an integral part of the EIA process whereas others see it as a separate field of study and a separate process[10]. To a large extent, whether or not socio-economic impacts

[10] Glasson, J. (2001), Socio-Economic Impacts 1: Overview and Economic Impacts in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.21.

should be considered in the EIA process depends on how broadly or narrowly the term 'environment' is defined. A narrow definition of the term 'environment' focuses on the bio-physical environment whereas a wider definition of the term encompasses the bio-physical environment and the socio-economic environment. Many commentators argue that the bio-physical and the socio-economic environments are inextricably linked. In this regard, Weston (1997) states the following:

> *"Our understanding and experience of 'the environment' is shaped by our relationship to it and the way we use and interact with it. The environment is not therefore something which is objectively experienced but something which is full of different and often competing values and interests. In this way the physical world is socially, culturally, economically and politically constructed and reconstructed and the physical world cannot be set apart from the forces that shape it. Any meaningful definition of 'environment' must therefore be able to relate the physical world to those forces"*[11].

This sentiment is reflected in the definition of the 'environment' used by the Australian and New Zealand Environment and Conservation Council i.e. "for the purposes of EIA, the meaning of environment incorporates physical, biological, cultural, economic and social factors"[12].

The term 'environment' is not explicitly defined in the EC Directives on EIA or in the corresponding Irish legislation. However, Article 3 of EC Directive 97/11/EC and Paragraph 2(b) of Schedule 6 of the Irish Planning & Development Regulations 2001 both list "human beings" as being one of the aspects of the environment which must be considered in the EIA process. From this, it could be inferred that socio-economic impacts should be considered in the EIA process in EU Member States (including Ireland). This is further evidenced by the fact that the EC Guidance Document –

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[11] Weston, J. (1997), Introduction: EIA in the UK, In Weston, J. (ed), *Planning & Environmental Impact Assessment In Practice*, Addison Wesley Longman, Harlow, p. 3.

[12] ANZECC (Australian and New Zealand Environment and Conservation Council) (1991), *A National Approach to EIA in Australia*, ANZECC, Canberra.

EIS Review[13] includes socio-economic impacts in an EIS Review Checklist[14] for reviewing the quality of EIS's.

However, in practice, EIA still tends to focus on the biophysical aspects of the environment[15]. Indeed, Glasson (2001)[16] refers to the consideration of social and economic impacts as being "the poor relation" in EIA. This appears to be the case even in the USA where formal EIA has been in existence for over thirty years. In this regard, Jain et al (2002) state that:

> *"The general consensus is that the examination of economic and social considerations is generally undertaken, under National Environmental Policy Act, only within rather specific limits. ..... It is generally acknowledged that NEPA is primarily an act for purposes of examining consequences of government actions on the biophysical environment. If there are no potentially significant consequences to the biological or physical environment, the requirement to prepare an EIS is not triggered. Thus, in the absence of potentially significant effects to the biophysical environment, socio-economic consequences alone, will not serve to trigger the requirement to prepare an EIS. If, however, there are sufficient potential effects on the biological and physical environment to require that an EIS be prepared, a full examination of social and economic effects is required"*[17].

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13 European Commission (2001), *Guidance on EIA – EIS Review*, Office for Official Publications of the European Communities, Luxembourg.

14 Question 4.16 of Section 4 Description of the Likely Significant Effects of the Project.

15 European Commission (2000), Socio-Cultural and Socio-Economic Impacts in *Towards Sustainable Economic and Development Co-operation – Environmental Integration Manual: Good Practice in EIA/ SEA*, p.247.

16 Glasson, J. (2001), Socio-Economic Impacts 1: Overview and Economic Impacts in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.21.

17 Jain, R., Urban, L. V., Stacey, G. S. & Balbach, H. (2002), *Environmental Assessment* (2nd Edition), McGraw Hill, USA, p.241.

Glasson (2001)[18] states that there may be several reasons why socio-economic impacts are considered the "poor relation" in EIA. He cites the general perception that socio-economic impacts seldom occur, are invariably negative, and cannot be easily measured as being the primary reason. He strongly opposes this viewpoint and he states that socio-economic impacts invariably follow from a development and that they are often positive, they can be measured and they are important. He further states that socio-economic impacts are important because the economic fortunes and lifestyles and values of people are important.

This study is based on the premise that socio-economic impact assessment should form an integral part of the EIA process, and that economic impacts, such as impacts on property values, should be considered in the EIA process.

2.5.2 'Impacts on Property Values' & the EIA Process

Some commentators (Glasson (2001)[19], Blackwell (1991)[20] and Fortledge (1990) [21] to name but a few) assert that impacts on property values are socio-economic impacts[22] and that they should be addressed in the EIS, if they are likely to be significant. However, within Ireland, there are widely differing views about whether this assertion is correct. Of those interviewed for the purpose of this study, the senior planners of three planning authorities (Donegal County Council, Dun Laoghaire/ Rathdown County Council and Galway City Council), one EIA consultant (Ms. Aoife

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18 Glasson, J. (2001), Socio-Economic Impacts 1: Overview and Economic Impacts in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.21.

19 Glasson, J. (2001), Socio-Economic Impacts 1: Overview and Economic Impacts in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.24.

20 Blackwell, J. M. (1991), Socio-Economic Impact Assessment, in Bradley, K., Skehan, C. & Walsh, G. (eds), *Environmental Impact Assessment A Technical Approach*, DTPS Ltd. Environmental Publications, Dublin, p. 51.

21 Fortledge, C.A. (1990), *Environmental Assessment*, Gower Publishing Co. Ltd., UK, p. 88 & p. 101.

22 In the EC's Report (European Commission (2000), Socio-Cultural and Socio-Economic Impacts in *Towards Sustainable Economic and Development Co-operation – Environmental Integration Manual: Good Practice in EIA/ SEA*) 'housing prices' is listed as a type of socio-economic impact.

Cassidy, Director of Tiros Resources Limited[23]) and one developer (Mr. Conor Byrne of Green Property plc) were resolute in their opinion that property values should not be considered in the EIA process. The reason cited, in all cases, was that Environmental Impact Assessment should only consider 'environmental' effects i.e. effects on the bio-physical environment. However, this interpretation of the 'environment' appears to be at variance with that of the Environmental Protection Agency (who prepared the National Guidelines on Information to be Contained in EIS's). Dr. Gerry Byrne of the EPA stated that the EPA take a broad view of the 'environment'[24].

With the exception of the senior planners in South Dublin County Council, who expressed ambivalence about the issue of whether property values should be considered in the EIA process, all of the other planning authorities, EIA consultants and developers consulted were of the opinion that property values should be considered in the EIA process. Their views and the supporting rationale for them are dealt with where appropriate throughout the course of this study.

Such conflicting views have arisen due to the ambiguous nature of the EC Directives on EIA and the corresponding Irish legislation in this regard. The Irish legislative provisions that are of pertinence to this issue are Part (c) of Paragraph 1 and Part (b) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001. Part (c) of Paragraph 1 states that the data required to identify and assess the main effects which the proposed development is likely to have on the environment must be included in the EIS. Part (b) of Paragraph 2 provides that further information, by way of explanation or amplification of the information referred to in Paragraph 1, should be provided in the form of:

> *A description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular:*

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23. Tiros Resources Limited were formed from part of Frank L. Benson & Associates, Chartered Town Planners.

24. Interview with Dr. Gerry Byrne, Environmental Protection Agency – Project Coordinator for the EPA's Guidelines on Information to be Contained in EIS's and the accompanying Advice Notes.

- *human beings, fauna and flora,*
- *soil, water, air, climatic factors and the landscape,*
- *material assets, including the architectural and archaeological heritage, and the cultural heritage,*

the inter-relationship between the above factors.

Although property values are not specifically mentioned in the above legislative provisions, property values could be considered under the headings of "Human Beings" or "Material Assets" (as discussed in Section 2.5.3) which ***are*** specifically listed as aspects of the environment in Part (b) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001.

By virtue of the fact that the impetus for this study came from the Environmental Research Unit[25] (within the Department of the Environment and Local Government), it is evident that the Department of the Environment and Local Government have interpreted the above legislative provisions as requiring the consideration of 'impacts on property values' in the EIA process.

Likewise, by the inclusion of 'property values' as a topic which would usually be addressed when undertaking an EIS for certain project types[26], (in Section 3 of the EPA's Advice Notes which accompany the National Guidelines on Information to be Contained in EIS's[27]), it is evident that the EPA have interpreted the legislation in the same manner. However, Section 5 of the Advice Notes contradicts Section 3 in that it states that a current problem in EIS's being submitted in Ireland is that the topic "Human Beings" can rapidly expand to include topics such as property values, which are considered outside the scope of EIA[28]. When

25 Refer to the letter from the Environmental Research Unit attached at Appendix 1.

26 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, Section 3, Project Types 3 & 4.

27 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

28 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, Section 5, p.1.

questioned about the contradictory statements, both Dr. Gerry Byrne of the EPA[29] and Mr. Conor Skehan, Director of CAAS Environmental Services Limited[30] (the consultants responsible for preparing the National Guidelines and Advice Notes on behalf of the EPA) stated that they reflect the differing views of various contributors to the National Guidelines and the accompanying Advice Notes, and that it should be remembered that the Advice Notes[31] is just an advisory document and that it has no statutory basis.

On the issue of whether or not property values should be considered in the EIA process, Mr. Conor Skehan[32] stated that, in the past, CAAS Environmental Services Limited have considered property values in EIS's that they have undertaken, but that because of the absence of a credible methodology for objective property value assessment, they no longer include the topic in EIS's. He further stated that property value is a very complex and subjective issue, and that in the interests of objectivity and replicability, property values should not be considered in the EIA process. However, Mr. Skehan did state that if a credible methodology for objective property value assessment was available, that he would consider the inclusion of 'impacts on property values' in EIS's, where appropriate.

A similar view was expressed by Ms. Lisa Mackey of CIE[33], the semi-state body responsible for the development of the LUAS light rail system in Dublin City. She stated that the potential impact of the LUAS development on property values was an issue that had been discussed by the project team with a view to including it in the EIS, but that the decision was made to exclude it from the EIS as there was no credible methodology for carrying out objective property value assessment.

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29 Interview with Dr. Gerry Byrne, Environmental Protection Agency – Project Coordinator for the EPA's Guidelines on Information to be Contained in EIS's and the accompanying Advice Notes.

30 Interview with Mr. Conor Skehan, Director of CAAS Environmental Services Limited.

31 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

32 Interview with Mr. Conor Skehan, Director of CAAS Environmental Services Limited.

33 Interview with Ms. Lisa Mackey, Chartered General Practice Surveyor, Property Department, CIE.

However, Dr. Brian Meehan of Brian Meehan & Associates[34] expressed a different view to property value assessment within EIA than that given by Mr. Conor Skehan or Ms. Lisa Mackey. Dr. Meehan's view concurs with the author's view. He stated that as the potential impact of a proposed development on property values was a material planning consideration[35], that it would be contrary to Irish planning law not to consider property values within the EIA process. He further stated that, even though the potential impact of a proposed development on property values cannot be precisely quantified, that it should not be omitted for this reason. It is his belief that if a proposed development is likely to have significant effects on surrounding property values, that the issue must be addressed in the EIS. In such instances, he believes that in the absence of a credible methodology for carrying out objective property value assessment, that a qualitative assessment must be undertaken.

Despite the conflicting views about the issue of whether property value assessment should be considered in the EIA process, nearly 20% of all EIS's submitted in Ireland during the ten year review period (1988 to 1997) considered the potential impact of the proposed development on property values. Table 2.2 on Page 25 provides a statistical breakdown on a year-by-year basis.

[34] Interview with Dr. Brian Meehan of Brian Meehan & Associates, Chartered Town Planners.

[35] The Fourth Schedule of the Planning & Development Act 2000 lists 'The depreciation of the value of property in the vicinity of a proposed development' as a non-compensatory reason (Reason 10(c)) for the refusal of planning permission.

Table 2.2: Number of EIS's Submitted in Ireland Between 1988 and 1997 that Considered 'Impact on Property Values'

Year	Total No. of EIS's Submitted	No. of EIS's that Considered 'Impact on Property Values'	% of EIS's that Considered 'Impact on Property Values'
1988	12	1	8.33%
1989	41	0	0%
1990	69	9	13.04%
1991	83	10	12.05%
1992	83	8	9.64%
1993	71	14	19.72%
1994	83	18	21.69%
1995	95	24	25.26%
1996	102	25	24.51%
1997	123	39	31.71%
Total	762	148	19.42%

Source: Author's Own Research.

It is interesting to note that the percentage of EIS's that considered 'impact on property values' has increased year-on-year since 1993, reaching a high of 31.71% in 1997. Therefore, at the end of the review period, nearly one in three EIS's being submitted in Ireland considered the potential impact of the proposed development on property values. It is evident from the above statistics, that a significant number of those preparing EIS's in Ireland, have interpreted the Irish legislation as requiring the consideration of 'impacts on property values' in the EIA process.

2.5.3 "Human Beings" or "Material Assets"?

If property values are to be considered in the EIA process, the next question is which aspect of the environment (as per Part (b) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001) should they be considered under. By a straight-forward process of elimination, it is evident that they could only be considered under the heading of "Human Beings" or "Material Assets".

The meaning of the term "Human Beings" is self-evident. The EPA's Advice Notes state that "Human Beings" is a "broad ranging section which covers the existence, activities and well-being of people"[36]. The term "Material Assets", on the other hand, is ambiguous and open to interpretation as it is not defined in the legislation (this is dealt with in detail in Section 2.6.1). The EPA define the term "Material Assets" as "resources, of either economic or natural origin, that are valued and that are intrinsic to specific places"[37] and they cite 'buildings' as an example of a "Material Asset".

Having regard to the above interpretations, 'impacts on property values' could conceivably be considered under both "Human Beings" and "Material Assets" as the impact could affect the economic well-being of people (human beings) and it could affect the value of material assets such as land and buildings. Indeed, in his commentary on the various aspects of the environment, Fortledge (1990)[38] discusses impacts on property values under both "Human Beings" and "Material Assets".

In Ireland, particularly in latter years, there has been a tendency to consider 'impacts on property values' under the heading of "Material Assets" as opposed to "Human Beings" or other socio-economic related headings such as 'Socio-Economic Impacts' or 'Employment and Economic Impacts'. This trend is reflected in the statistics presented in Table 2.3. on Page 27.

[36] Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 10.

[37] Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 31.

[38] Fortledge, C.A. (1990), *Environmental Assessment*, Gower Publishing Co. Ltd., UK, p. 88 & p. 101.

Table 2.3: Headings which 'Impact on Property Values' was Considered Under (for the 148 EIS's that were submitted in Ireland between 1988 and 1997 that Considered 'Impacts on Property Values')

Year	No. of EIS's	Heading that 'Impact on Property Values' was Considered Under					
		"Material Assets"		"Human Beings"(1)		Other Headings(2)	
		No.	%	No.	%	No.	%
1988	1	0	0%	0	0.00%	1	100.00%
1989	0	-	-	-	-	-	-
1990	9	2	22.22%	1	11.11%	6	66.67%
1991	10	2	20.00%	0	0.00%	8	80.00%
1992	8	1	12.50%	2	25.00%	5	62.50%
1993	14	7	50.00%	1	7.14%	6	42.86%
1994	18	12	66.67%	2	11.11%	4	22.22%
1995	24	17	70.83%	3	12.50%	4	16.67%
1996	25	19	76.00%	2	8.00%	4	16.00%
1997	39	32	82.05%	1	2.56%	6	15.39%
Total	148	92	62.16%	12	8.11%	44	29.73%

Source: Author's Own Research.

Notes:

(1) EIS's that considered 'impact on property values' under the heading of 'Population' or 'Human Environment' are included under "Human Beings".

(2) Other Headings include headings such as Socio-Economic Impacts, Social & Economic Consequences, Property Impact and Employment & Economic Impacts.

From the above statistics, it can be seen that, since 1994, over two-thirds of the EIS's submitted in each year that considered 'impact on property values', considered it under the heading of "Material Assets". The percentage of EIS's that considered 'impact on property values' under the heading of "Material Assets" has increased steadily each year, reaching a high of 82.05% in 1997.

In Section 2.6, the author argues the case for the consideration of 'impacts on property values' under the heading of "Material Assets".

2.6 "MATERIAL ASSETS"

2.6.1 Ambiguity Surrounding the Term "Material Assets"

The term "Material Assets" referred to in Part (b) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001 is taken directly from a similarly worded paragraph (Paragraph 3 of Annex IV) of the EC Directive 97/11/EC[39]. The term "Material Assets" is not defined in either of the EC Directives on EIA or in the corresponding Irish legislation. This has led to a lot of ambiguity and misinterpretation of the term. Indeed, in the European Commission's 1997 Update Report on the Review of the Implementation of Directive 85/337/EEC[40], the term "Material Assets" was cited as being one of the provisions of the Directive that Member States regarded as being ambiguous and difficult to interpret.

EC Directives are drafted in French and the term "Material Assets" is translated from the French term "les biens materiels". Fry (1998)[41] states that this term has legal meaning in some European jurisdictions but has no legal equivalent in Ireland. However, the author was unable to substantiate this. Mr. Arnaud Cras[42] of the Law Faculty in University College Dublin stated that the term "les biens materiels" has a general meaning in France but that it does not have a definitive meaning in French law. In any regard, a representative[43] of the Legal Implementation and Enforcement Unit of the Environment Section of the European Commission advised against applying possible meanings of the term "Material Assets" from other jurisdictions to EIA. The official stance of the EC is that the definitive interpretation of the precise scope of the term "Material Assets" is a matter for the Court of Justice. In the absence of such a ruling, the term will remain ambiguous and open to interpretation.

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39 The term "Material Assets" was included (in the same context) in Paragraph 3 of Annex III of the previous EC Directive on EIA i.e. EEC Directive 85/337/EEC.

40 Available at www.europa.eu.int/comm/environment/eia/eia-studies-and-report/5years.pdf, p.25.

41 Fry, J. (1998), The Amended EIA Directive 1997, *Irish Planning and Environmental Law Journal*, Vol. 5, No. 1, 7-12, p. 8.

42 In conversation with Mr. Arnaud Cras of the Law Faculty of University College Dublin.

43 E-mail correspondence with Mr. Antti Mauna, Unit D. 2 (Legal Implementation and Enforcement), DG Environment, European Commission.

Therefore, despite the fact that the term "Material Assets" has been included in EC law on EIA for seventeen years (since the adoption of EEC Directive 85/337/EEC in 1985), there is very little guidance at EC level as to what the term actually means. The only guidance which the author came across is contained in the EC Guidance Document on EIA – EIS Review[44] where "Material Assets" are described as including "buildings, other structures, mineral resources, water resources"[45].

Similarly, the term "Material Assets" has been included in Irish EIA legislation for thirteen years (since the implementation of the European Communities (EIA) Regulations 1989), yet, the Department of the Environment and Local Government could not provide a definition of the term[46]. From an Irish viewpoint, Fry (1998)[47] refers to the term "Material Assets" as a "frequently ridiculed term" and he states that the ambiguity of the term has caused problems for developers and assessors alike. This view concurs with that of An Taisce (1993)[48] who claim that due to the absence of a definition of "Material Assets", that many EIS's have inadequately addressed issues under this heading or have ignored them altogether. Section 2.6.2 examines various interpretations of the term "Material Assets" with a view to determining whether or not 'impacts on property values' should be considered under the heading of "Material Assets".

2.6.2 Various Interpretations of the Term "Material Assets"

Fortledge (1990)[49] provides a very broad interpretation of the term "Material Assets" by stating that it "could cover almost any physical or

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44 European Commission (2001), *Guidance on EIA – EIS Review*, Office for Official Publications of the European Communities, Luxembourg.

45 Part 3.11 of Section 3 Description of Environment Likely to be Affected by the Project in EC's Guidance Document on EIA – EIS Review.

46 Interview with Mr. Enda Casey, Higher Executive Officer in the Planning & Development Section of the Department of the Environment and Local Government.

47 Fry, J. (1998), The Amended EIA Directive 1997, *Irish Planning and Environmental Law Journal*, Vol. 5, No. 1, 7-12, p. 8.

48 Meldon, J. (1993), *Environmental Impact Assessment - Theory and Practice in Ireland*, An Taisce, p. 7.

49 Fortledge, C.A. (1990), *Environmental Assessment*, Gower Publishing Co. Ltd., UK, p. 101.

indeed, any non-physical sector that could be said to have a material value". From an Irish viewpoint, Skehan[50] (1991) stated that the term "Material Assets" is "open to interpretation as those compounds of the environment (natural and manmade) which may be regarded by society as being of value for production, development, maintenance, recreation or well-being". He further comments that topics which may be covered under the heading of "material assets" include:-

- Commercial minerals;
- Ownership;
- Access;
- Development potential;
- Recreation potential;
- Assimilation capacity (air, water);
- Natural features such as deep berthage, hydraulic head and wind resources;
- Manmade features such as transportation routes, physical infrastructure, built fabric and social services[51].

The EPA Guidelines on the Information to be Contained in Environmental Impact Statements do not contain a definition of the term "Material Assets". However, they do provide a range of topics which could be addressed under the heading "Material Assets". These include:

- Archaeological Heritage
- Folklore/ Tradition/ History
- Architecture/ Settlements
- Monuments/ Features
- Designed Landscape
- Natural Resources of Economic Value including Buildings & Structures and Infrastructure. In a footnote, it states that Resources that are valued and that are intrinsic to specific places

50 Conor Skehan is the director of CAAS Environmental Services Limited, the consultants responsible for preparing the Guidelines on the Information to be Contained in EIS's and the accompanying Advice Notes on behalf of the Environmental Protection Agency.

51 Skehan, D. C. (1991), Methodology for Carrying out an EIS, in Bradley, K., Skehan, C. & Walsh, G. (eds), *Environmental Impact Assessment - A Technical Approach*, DTPS Ltd. Environmental Publications, Dublin, p. 44.

are called "material assets". They may be of either human or natural origin and the value may arise for either economic or cultural reasons[52].

The EPA's Advice Notes to the Guidelines on Information to be Contained in EIS's qualifies the above further by stating that economic assets of human origin include:

- Cities, Towns, Villages and Settlements
- Transportation Infrastructure (Roads, Railways, Airports, Etc.)
- Major Utilities (Water Supplies, Sewage, Power Systems, Etc.)
- Ownership and Access[53].

From the various interpretations provided in this section, it is evident that land and buildings are regarded as "Material Assets".

2.6.3 Consideration of 'Property Values' Under the Heading of "Material Assets"

Impacts on property values are economic impacts upon "Material Assets" i.e. land and buildings. For this reason, the Environmental Protection Agency advocate the consideration of 'property values' under the heading of "Material Assets"[54]. This is evidenced by the fact that 'Effects on Land or Property Prices' and 'Property Value' are listed as topics which would usually be addressed under the heading of "Material Assets" for a number of the 32 generic Project Types listed in the Advice Notes[55].

All of the planners, EIA consultants and developers interviewed by the author that were of the opinion that property values should be considered in the EIA process, felt that it was most appropriate to consider property

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52 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 22.

53 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p.31.

54 Interview with Dr. Gerry Byrne, Environmental Protection Agency – Project Coordinator for the EPA's Guidelines on Information to be Contained in EIS's and the accompanying Advice Notes.

55 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, Section 3.

values under the heading of "Material Assets" as opposed to "Human Beings".

2.7 CONCLUSION

Despite the conflicting views on the issue of whether property values should be considered in the EIA process, it is evident from the author's research, that property values ***should*** be considered in the EIA process. Property values may be considered under the heading of "Material Assets" or "Human Beings". However, the tendency in Ireland, particularly in latter years, has been to consider 'impacts on property values' under the heading of "Material Assets". This is due to the fact that an impact on property values is regarded as an economic impact on "Material Assets" i.e. land and buildings. It is evident from the author's research, that a growing number of those preparing EIS's in Ireland concur with this view.

Weston (1997) states that "Economic impacts are often impacts upon 'material assets' and clearly need to be included within Environmental Statements where the impacts are likely to be significant"[56]. Proposed developments will impact on property values to varying degrees, and possibly not at all in some cases. Therefore, it is not necessary for every EIS to include an assessment of the likely effects of the proposed development on property values. The significance of the potential impact is the determining factor. The issue of significance is examined in Chapter 3.

[56] Weston, J. (1997), EIA and Public Inquiries in Weston, J. (ed), *Planning & Environmental Impact Assessment in Practice*, Addison Wesley Longman, Harlow, p.138.

CHAPTER THREE

Significance

CHAPTER THREE

SIGNIFICANCE

3.1 INTRODUCTION

Property value assessment should only be included in an EIS in instances where the proposed development is likely to have "significant effects" on the surrounding land and property values. In order to establish what the term "significant effects" means, this chapter examines the relevant legislative provisions and current literature on the subject. The chapter culminates in an examination of how significance in relation to property values is determined in Irish EIA practice.

Please note that the words 'effect' and 'impact' as referred to throughout this chapter are considered to be synonymous.

3.2 EIS SHOULD ONLY ADDRESS "SIGNIFICANT EFFECTS"

Paragraph 1 (c) of Schedule 6 of the Planning & Development Regulations 2001 states that an EIS must include "the data required to identify and assess the main effects which the proposed development is likely to have on the environment". Therefore, an EIS is required to describe the main or significant effects on the environment, not all the effects. Scannell (2002)[1] states that the best summary of this obligation is that of Sullivan J. in *R v Rochdale Metropolitan Borough Council, ex. p. Milne*[2] where he stated that an environmental impact statement does not have to describe every environmental effect, however minor, but only the "main effects" or "significant effects"[3]. Therefore, property value assessment should only be included in an EIS in instances where the proposed development is likely to have "significant effects" on surrounding land and property values. In

1 Taken from a forthcoming article provided by Professor Yvonne Scannell, Law Faculty, Trinity College Dublin.

2 [2001], *Journal of Planning and Environment Law*, p.470.

3 The term "significant effects" is taken from Article 1 of EC Directive 97/11/EC on EIA.

order to determine when this may be, it is necessary to establish what constitutes a "significant effect".

3.3 WHAT IS A "SIGNIFICANT EFFECT"?

3.3.1 Key Issues

Fortledge (1990)[4] defines "significant effects" as "effects which disturb or alter the existing environment to a measurable degree". However, he also states that what is, or is not, a significant effect is one of the most difficult areas of EIA to define. In establishing what a "significant effect" is, there are two key issues:

- What type of "effects" (e.g. direct, indirect, etc.) should be considered; and
- What is the meaning of the term "significant".

These issues are dealt with in Sections 3.3.2 and 3.3.3.

3.3.2 Types of Effects that should be Considered

Part (c) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001 qualifies the term "significant effects" by stating that it includes direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects[5]. Therefore, the types of effects that should be considered are as follows:

- Direct Effects i.e. that are a direct result of the development.
- Indirect/ Secondary Effects i.e. that may be 'knock-on' effects of (and in the same location as) direct effects, but are often produced in other locations.
- Cumulative Effects i.e. that accrue over time and space from a number of developments or activities, and to which a new project may contribute.

All effects may be positive (beneficial) or negative (adverse), short, medium or long-term, and permanent or temporary.

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4 Fortledge, C.A. (1990), *Environmental Assessment*, Gower Publishing Co. Ltd., UK, p. 9.

5 This is taken directly from a footnote to Paragraph 4 of Annex IV of EC Directive 97/11/EC.

Most commentators agree that direct effects are usually relatively easy to identify, but that accurate predication of indirect/ secondary and cumulative effects can prove much more problematic. The EPA state that the prediction of such impacts can be difficult until the full extent of the direct effects has been established, together with their mitigation measures[6]. The European Commission regard the consideration of indirect/ secondary and cumulative impacts as an integral part of the EIA process[7], and therefore, such impacts should not be overlooked. EC Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions[8] were published in 1999.

3.3.3 Meaning of the Word "Significant"

The term "significant" is not defined in either of the EC Directives on EIA or in the corresponding Irish legislation. Scannell (1995)[9] states that the word "significant" is borrowed from US law, but that even in the US there is little guidance as to what the term definitively means. Glasson et al (1999)[10] describe 'significance' as "the importance for decision making" i.e. establishing whether or not an impact is important enough to be considered in the decision-making process.

In the Irish Guidelines, the EPA state that significance is usually understood to mean either the importance of the environment that is affected (its sensitivity to change) or the importance of the outcome of the impact (the consequences of the change)[11]. They define a 'significant

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6 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 26.

7 European Commission Directorate-General XI, Environment, Nuclear Safety and Civil Protection (1999), *Study on for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions – Volume 1: Background to the Study*, p. 6.

8 European Commission Directorate-General XI, Environment, Nuclear Safety and Civil Protection (1999), *Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions*.

9 Scannell, Y. (1995), *Environmental and Planning Law in Ireland*, Round Hall Press, Dublin, p. 296.

10 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 130.

11 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 24.

impact' as "an impact which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment"[12]. Morris and Therivel (2001) put this more succinctly when they describe 'impact significance' as "the 'product' of an impact's characteristics (magnitude and extent in space and time) and the value, sensitivity/ fragility and recoverability of the relevant receptor(s)"[13].

In conclusion, a "significant effect" could be defined as any direct, indirect/ secondary or cumulative impact that is deemed important enough to be considered in the EIA process, having regard to the importance of the receiving environment.

3.4 DETERMINING THE SIGNIFICANCE OF AN EFFECT

The EC Guidance Document (Guidance on EIA – Screening[14]) states that a useful simple check for determining the significance of an effect is to ask whether the effect is one that ought to be considered and that ought to have an influence on the development consent decision. Prima facia, it appears that determining significance is a relatively straight-forward process, but in practice, the determination of significance has proved to be a very complex and difficult issue. Indeed, Fortledge (1990)[15] refers to it as being one of the most difficult areas of the EIA process.

Guidance is provided at EC level and at a National level about determining the significance of an effect. The EC Guidance Document (Guidance on EIA – Screening[16]) contains a checklist of criteria for evaluating the significance of environmental effects. The checklist is set out in Table 3.1 on Page 37.

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12 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 33.

13 Morris, P. & Therivel, R. (2001), Introduction in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.8.

14 European Commission (2001), *Guidance on EIA – Screening*, Office for Official Publications of the European Communities, Luxembourg.

15 Fortledge, C.A. (1990), *Environmental Assessment*, Gower Publishing Co. Ltd., UK, p. 9.

16 European Commission (2001), *Guidance on EIA – Screening*, Office for Official Publications of the European Communities, Luxembourg.

Table 3.1 Checklist of Criteria for Evaluating the Significance of Environmental Effects

Questions to be Considered
1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the effect be unusual in the area or particularly complex?
4. Will the effect extend over a large area?
5. Will there be any potential for transfrontier impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the effect continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

Source: European Commission (2001), *Guidance on EIA – Screening*, Office for Official Publications of the European Communities, Luxembourg.

In Ireland, the EPA had regard to Schedule 7 of the Planning & Development Regulations 2001 when they were compiling their guidelines on significance (contained in the Guidelines on Information to be Contained in EIS's[17]). Schedule 7 contains criteria for determining whether or not a sub-threshold development would be likely to have significant effects on the environment. The criteria are taken directly from Annex III of the EC Directive 97/11/EC and they relate to the characteristics of the

[17] Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

proposed development, the location of the proposed development and the characteristics of potential impacts.

The EPA state that significance is determined by a combination of objective (scientific) and subjective (social) concerns[18]. They state that objective concerns arise if a development could cause significant impacts on an aspect of the environment which has been formally or systematically designated as being of importance and/ or if the potential exists for the development to significantly alter the existing character of some aspect of the environment. In relation to the first aspect, the EPA have identified a number of types of geographic areas that are generally regarded as being particularly sensitive and/ or significant[19]. Many of these areas are officially designated, but some are not. Table 3.2 contains a list of what are deemed to be significant environments.

Table 3.2: Significant Environments

- Wetlands
- Coastal Zones
- Mountains and Forest Areas
- Nature Reserves and Parks
- Areas classified or protected under legislation, including special protection areas designated pursuant to Directives 74/409/EEC and 92/43/EEC
- Areas in which environmental quality standards set by legislation have already been exceeded (i.e. areas where the capacity of the environment to facilitate more development has been exceeded)
- Densely Populated Areas
- Landscapes of Historical, Cultural or Archaeological Significance

Source: Section 3.2.4 of the EPA Guidelines on Information to be Contained in EIS's.

[18] Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 24.

[19] Taken directly from Paragraph 2 of Schedule 7 of the Planning & Development Regulations 2001, which in turn, was taken directly from Paragraph 2 of Annex III of EC Directive 97/11/EC.

With regard to objective concerns, the EPA have identified four objective criteria which can be used to determine whether an impact is of significance. These are as follows:

- Magnitude and Intensity – any development which causes effects over a wide area, to a large number of receptors, or effects which are of an intensity which is significantly in excess of those normally experienced.
- Integrity – the degree to which the character or attributes of the baseline environmental topic is continued, enhanced or reduced.
- Duration – any development which can cause impacts for a long period of time (more than one generation) or which will cause permanent change to any aspect of the environment.
- Probability – where the magnitude, intensity, duration or consequences of any change cannot be anticipated with a reasonable level of certainty[20].

In relation to subjective concerns, the EPA state that a topic can acquire significance where society as a whole, a community or a significant number of individuals are concerned. They further state that subjective concerns usually arise where some aspect of a development may adversely affect them or something that they value[21]. As subjective concerns are based on value judgements, it can be difficult to establish when a potential effect becomes significant.

A useful summary of the criteria for determining significance is provided by Glasson et al (1999)[22]. They state that the criteria include the magnitude and likelihood of the impact and its spatial and temporal extent, the likely degree of the affected environment's recovery, the value of the affected environment, the level of public concern, and political repercussions. They further state that the determination of significance is a subjective exercise,

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20 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 24.

21 Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 24.

22 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 140.

as it normally involves value judgements[23]. On this point, Scannell (2002)[24] states that the Court's observations in a Canadian case *Residents Against Company Pollution Inc., Re: Section 38 of the Environment Bill of Rights 1993* on the concept of "significant harm to the environment" are instructive. In this case it stated:

> *"Because of the inherent subjectivity of the concept "significant harm", the Board should attempt to use a test which does not rely on the individual views of its members. Where possible, significance should be determined by reference to scientific principles and evidence or legal criteria"*[25].

Where the significance of potential environmental effects can be determined 'by reference to scientific principles and evidence or legal criteria', the evaluation is quantitative and has the merit of being objective. However, some environmental effects are more readily quantifiable than others, e.g. the level of a pollutant could be assessed in relation to a statutory threshold value. In instances where the potential environmental effects are less tangible, such as in the case of property values, the question of determining significance becomes much more difficult as qualitative standards are involved. Glasson et al (1999)[26] comment that such assessments of significance either implicitly or explicitly apply weights to the various impacts and that this involves interpretation and the application of judgement. Judgements are based on values, which by their nature, are subjective. It is for this reason that differences of opinion can arise among the various participants in the EIA process i.e. the developer, the EIA consultant, the 'competent authority', the environmental/ professional bodies consulted and the general public, about the 'significance' of a particular environmental effect.

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23 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 130.

24 Taken from a forthcoming article provided by Professor Yvonne Scannell, Law Faculty, Trinity College Dublin.

25 20 C.E.L.R. (N.S.) 97.

26 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 141.

In conclusion, Canter and Canty (1993)[27] capture the multi-faceted nature of significance determination when they state that "significance is sometimes based on professional judgement, executive authority, the importance of the project/issue, sensitivity of the project/ issue, and context; or by the controversy raised. Decisions of significance will not necessarily be determined on verifiable evidence, but may include intuition". To this end, Glasson et al (1999) assert that "much, if not most, current evaluation of significance in EIA is simple and often pragmatic, drawing on experience and expert opinion"[28].

3.5 "Significant Effects" on Property Values

3.5.1 Effects that may Significantly Affect Property Values

Some of the types of developments which are listed in Parts I and II of Schedule 5 of the Planning & Development Regulations 2001 (i.e. developments that are required to be subjected to EIA) have the potential to significantly affect land and property values. Location is a primary determinant in the valuation of land and property. Therefore, if a development changes the attractiveness of an area for human habitation and/ or for commercial investment, there will be a resultant impact on land and property values in the area.

Blackwell (1991)[29] identifies migration to or from an area as being a direct effect of a proposed development which can indirectly affect land and property values within the area. He states that in-migration may be triggered by enhanced job opportunities or higher relative income, whilst out-migration from an area, or movement within it, may be as a result of a desire to avoid the inconvenience, disimproved appearance, perceived health hazard or other aspect of disutility arising from a location in

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27 Canter, L. W. & Canty, G. A. (1993), Impact Significance Determination – Basic Considerations and a Sequenced Approach, *EIA Review*, Vol. 13, 275-297, p.291.

28 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 141.

29 Blackwell, J. M. (1991), Socio-Economic Impact Assessment, in Bradley, K., Skehan, C. & Walsh, G. (eds), *Environmental Impact Assessment A Technical Approach*, DTPS Ltd. Environmental Publications, Dublin, p. 51.

proximity to certain types of developments. He identifies developments such as nuclear industries, oil and gas developments, and major construction projects (including urban redevelopment) as "high impact" developments which are likely to result in considerable out-migration from an area, or at least, the deterrence of in-migration. He asserts that in such instances, that the indirect impact of the proposed development on land and property values should be considered in the EIS.

Land and property values can also be affected by secondary/ associated developments i.e. developments that arise solely as a consequence of the existence of the principle project. Major developments, such as infrastructural projects, can stimulate or induce secondary effects in the form of associated investments and changed patterns of human and social activity. Examples of secondary/ associated developments are as follows:

- New industrial, warehousing, office or retail development in the immediate vicinity of a new transportation node.
- New residential and commercial development in response to a large new employer in an underdeveloped area.
- New industrial developments in the vicinity of major sources of primary raw materials such as gas, oil, etc.
- New supplies or services in the vicinity of major manufacturing enterprises.

The EPA Guidelines state that the impacts of secondary developments can "often be as significant as those of the main project"[30] and should not be overlooked. Therefore, if land and property values are likely to be significantly affected by the secondary effects of a proposed development, they should be considered in the EIA process.

As is evident from the above, land and property values are primarily affected as a result of indirect or secondary effects. If significant, these effects should be addressed in the EIS as Part (c) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001 specifically provides for the consideration of such effects in the EIA process.

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[30] Environmental Protection Agency (2002), *Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland, p. 19.

3.5.2 Types of Developments that may Affect Land and Property Values

Section 3 of the EPA's Advice Notes to Guidelines on Information to be Contained in EIS's[31] provides some guidance about the types of developments that may affect land and property values. As afore-mentioned in Section 2.4.1, the EPA condensed the 134 project types listed in Schedule 5 of the Planning & Development Regulations 2001 into 32 generic Project Types. For each Project Type, they have provided a list of topics which would usually be addressed when preparing an EIS for a development from within that particular Project Type. The Project Types which include topics which relate to effects on land and property are detailed in Table 3.3. on Page 44.

From Table 3.3, it is evident that the EPA recognise that certain types of developments may cause significant direct, indirect and/ or secondary effects on land and property. However, despite this fact, only two of the 32 Project Types (Project Types 3 and 4[32]) specifically include 'land and property values' as a topic which would usually be addressed in an EIS for a development from within that particular Project Type. A representative of the EPA[33] stated that the reason for this is that Project Types 3 and 4 are likely to significantly affect land and property values in the majority of cases, if not all, whereas the other Project Types may only significantly affect land and property values in certain instances. He further stated that it was a reasonable supposition that if land and property values were likely to be significantly affected by a proposed development, that they should be considered in the EIS, but that this was a matter of discretion. Finally, it must be remembered that the EPA's Advice Notes is only an advisory document and that it has no legal status.

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31 Environmental Protection Agency (2000), *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements*, Environmental Protection Agency, Ireland.

32 Project Types 3 and 4 correspond to the projects listed in Paragraph 2 (b) and 3 of Part I and Paragraph 3(g) of Part II in Schedule 5 of the Planning & Development Regulations 2001.

33 Interview with Dr. Gerry Byrne, Environmental Protection Agency – Project Coordinator for the EPA's Guidelines on Information to be Contained in EIS's and the accompanying Advice Notes.

Table 3.3: Project Types which Include Topics which Relate to Effects on Land & Property

Project Type	Description	Topics
3	Nuclear power station or other nuclear reactor; Installations for production or enrichment of nuclear fuels; Installations for the processing of irradiated nuclear fuels or high level radioactive waste	• Effects on land or property prices
4	Installations designed solely for the permanent storage or final disposal of radioactive waste and irradiated fuel	• Property values
8	Railway Lines; Tramways; Elevated and Underground Railways; Intermodal Transhipment Facilities and Terminals	• Linear barrier to future development • Opportunities for development at nodes
9	Airports; Airfields	• Displaced settlement patterns (residential) • Opportunities for development
10	Inland Waterways and Ports; Trading Ports; New or Extended Harbours; Seawater and Freshwater Marinas	• Opportunities for development
19	Extraction of petroleum; Extraction of natural gas both onshore and offshore	• New economic activities • Settlement patterns
20	Industrial installations and pipelines for the transport of gas, oil or chemicals, steam and hot water; Construction of overhead power lines; Installations of overground aqueducts; Ski-runs, ski-lifts and cable-cars	• Settlement patterns • New land uses • Sterilisation of lands from development
21	Installations for storage of petroleum, petrochemical and chemical products; Installations for surface storage of natural gas and fossil fuels; Installations for underground storage of combustible gases	• Sterilisation of lands from development
22	Installations for industrial briquetting of coal and lignite	• Impact of potential contamination on possible future land uses
30	Wastewater Treatment Plants	• Diminution of amenities for residential and leisure land-uses
31	Installations for the disposal of waste; Sludge deposition sites; Landfill operations	• Diminution of amenities for residential and leisure land-uses

Source: Taken from Section 3 – Topics Usually Addressed in EIS's for Particular Project Types in the EPA's *Advice Notes to Guidelines on the Information to be Contained in Environmental Impact Statements* (2002).

Section 3.5.3 examines how significance in relation to property values is determined in practice.

3.5.3 Determination of Significance in Practice

Due to the fact that there is no credible methodology for accurately quantifying the significance of potential impacts of proposed developments

on property values, the determination of significance in relation to property values is subjective.

Two of the EIA consultants[34] and five of the planning authorities[35] interviewed for the purpose of this study stated that they used their expertise and experience to determine significance in relation to property values. In determining significance, they have regard to the size and nature of the proposed development, the nature of the surroundings of the proposed location and the other quantifiable potentially significant impacts of the proposed development, such as noise, traffic, air pollution, the degree of overshadowing, etc. In this regard, Mr. David Travis of South Dublin County Council[36] provided the following example. Following a review of the adequacy of an EIS submitted by the Football Association of Ireland for a proposed football stadium in Tallaght, Co. Dublin, the developer was requested to provide further information in the form of a valuers report on the potential impact of the proposed development on surrounding property values. In this instance, the planning authority considered that the proposed development had the potential to significantly affect property values. The factors they took into consideration when arriving at this decision were as follows:

- The nature and size of the development;
- The nature of the receiving environment – it was a predominantly residential area[37]; and
- The increased traffic and noise pollution that the proposed development was likely to generate (based on the findings within the EIS).

The potential impact of a proposed development on property values can also be determined as significant in instances where a community or a significant number of individuals are concerned that some aspect of the

34 Mr. Conor Skehan and Dr. Brian Meehan.

35 The senior planners of Dublin City Council, Dun Laoghaire/ Rathdown County Council, South Dublin County Council, Limerick City Council and Waterford City Council.

36 Interview with Mr. David Travis, Senior Planner, South Dublin County Council.

37 'Densely populated areas' is listed as a particularly sensitive/ significant environment in Paragraph 2 of Annex III of EC Directive 97/11/EC and in Paragraph 2 of Schedule 7 of the Planning & Development Regulations 2001. However, no definition of 'densely populated' is provided.

proposed development may adversely affect the value of their properties, such as in the case of the Dublin Port Tunnel (detailed below). Inevitably, due to the subjective and emotive nature of this issue, there can often be a difference between the impact as perceived by the public and the actual impact. However, Glasson (2001) states that "the impacts of a development as perceived by residents of a locality may be significant in determining local responses to a project" and that "they can constitute an important source of information to be considered alongside more 'objective' predications of impacts"[38]. Public consultation meetings about a proposed development provide an ideal forum for such concerns to be raised and for possible 'acceptable' solutions to be discussed.

Indeed, as afore-mentioned in Section 2.2, EIA is not just concerned with the production of an EIS, and the consideration of methods to mitigate potential adverse effects is an integral part of the process. In this regard, if a proposed development was perceived as being likely to adversely affect property values, the design/ location of the proposed development could be changed in an attempt to reduce or eliminate the potential adverse effects. Mr. Rory Deegan[39], a planner with Dublin City Council, who was involved in the Dublin Port Tunnel project provided a very good illustration of this. In this instance, even though the potential impact of the Dublin Port Tunnel on property values was not explicitly dealt with in the EIS, the topic was considered in the overall EIA process and it resulted in two significant changes being made to the design proposal. When the proposal was announced, property owners in two separate areas of Dublin City raised concerns about the potential impact of the tunnel on the value of their properties. Residents in the vicinity of the proposed location of the entrance to the tunnel raised concerns in relation to the potential impact that increased noise levels would have on the amenity of their properties. Even though the predicted noise levels were within EU Guidelines, the residents concerns resulted in the location of the entrance to the tunnel being moved further north to the M1 Motorway, where it will affect

[38] Glasson, J. (2001), Socio-Economic Impacts 1: Overview and Economic Impacts in Morris, P. & Therivel, R. (eds), *Methods of Environmental Impact Assessment* (2nd Edition), UCL Press, London, p.25.

[39] Interview with Mr. Rory Deegan, Deputy Planning Officer, Dublin City Council.

significantly less residential properties. Also, residents in the Marino area of the city expressed concerns about the potential destabilisation of their properties due to the boring of the tunnel underneath them. Again, even though the proposed depth of the tunnel was deeper than the depth required by international standards, the design proposal was changed and the tunnel is being bored at a deeper level.

Potentially adverse impacts on property values can also be reduced or eliminated by other remedial actions such as the planting of trees to screen a view or to reduce noise pollution or the installation of double glazing to reduce exposure to increased noise levels.

Consultations at an early stage in the EIA process help to allay public fears and the incorporation of mitigating measures into the development proposal, ultimately benefits the developer in that less objections to the planning application for the development proposal are likely to be lodged. Similarly, early consultations between the developer and the planning authority can result in the EIA process being more focused on the likely significant impacts. On this point, it is the author's opinion that the scoping process, as provided for by S. 173(2) of the Planning and Development Act 2000, provides an ideal opportunity for the developer/ developer's EIA consultant to establish, from the outset, what the 'competent authority' consider to be the most likely significant effects of the proposed development. This would establish whether the 'competent authority' regard the potential impact of the proposed development on property values as significant enough to be considered in the EIS.

3.5.4 Significance & Property Values: Some Final Observations

This chapter began by stating that property value assessment should only be included in an EIS in instances where the proposed development is likely to have "significant effects" on the surrounding land and property values. However, a review of the 148 EIS's submitted to 'competent authorities' in Ireland between 1988 and 1997 that considered the potential impact of the proposed development on property values, revealed that 35.81% of the EIS's concluded that the potential impact of

the proposed development on property values was negligible. In all instances, this conclusion was reached without employing quantitative assessment methodologies, and as such, it raises the question of why so many developers/ EIA consultants include property values in EIS's when they are not expected to be significantly affected. It is the author's opinion, that this issue is being included in EIS's to allay public concerns in this respect. Table 3.4 classifies the overall findings of property value assessments undertaken in EIS's submitted in Ireland during the ten year review period.

Table No. 3.4: Overall Findings of Property Value Assessments Undertaken in EIS's Submitted in Ireland 1988-1997

Potential Impact on Property Values	Number of EIS's[1]	% of EIS's
Negligible/ No Significant Adverse Impact	53	35.81%
Beneficial/ Positive	59	39.86%
Adverse/ Negative	24	16.22%
Uncertain/ Impact not Defined	12	8.11%
Total	148	100.00%

Source: Author's Own Research.

Notes:

(1) Relates to the 148 EIS's submitted to 'competent authorities' in Ireland between 1988 and 1997 that considered the impact of the proposed development on property values.

Perhaps a more serious issue that is raised by the above statistics, and indeed it was one that was alluded to by a number of those interviewed for the purposes of this study, is that developers/ developer's EIA consultants may be more likely to include property values in an EIS in instances where the potential impact is likely to be beneficial or negligible, and that possibly the topic is being omitted in some instances where property values are likely to be significantly adversely affected. The developer or the developer's EIA consultant carries out the EIA and prepares the EIS, and as such, they are unlikely to predict that the proposed development will significantly adversely affect property values because of the possible planning objections and litigation that its inclusion may invite. This raises the question of how objective the Irish EIA system is and whether it is too

developer-led[40]. However, in the absence of 'before and after' studies to assess the actual impacts on property values, it is impossible to substantiate such claims.

3.6 CONCLUSION

Property value assessment should only be included in an EIS in instances where the proposed development is likely to have "significant effects" on surrounding land and property values. Effects may be direct, indirect/ secondary or cumulative and they may be positive or negative, short, medium or long-term and permanent or temporary.

Due to the fact that there is no credible methodology for accurately quantifying the significance of potential impacts of proposed developments on property values, the determination of significance in relation to property values is subjective. The author's research indicates that, in practice, EIA consultants and planners determine significance in relation to property values using their expertise and experience. In doing so, they generally have regard to the following factors:

- The nature and size of the proposed development;
- The nature of the surroundings of the proposed location;
- The other quantifiable potentially significant impacts of the proposed development, such as noise, traffic, air pollution, the degree of overshadowing, etc.
- The public's perception of the likely impact of the proposed development on surrounding property values.

[40] Barrow, C. J. (1997), *Environmental and Social Impact Assessment – An Introduction*, Arnold, UK.

CHAPTER FOUR

Property Value Assessment Within EIA

CHAPTER FOUR

PROPERTY VALUE ASSESSMENT WITHIN EIA

4.1 INTRODUCTION

Once it has been established that a proposed development is likely to significantly affect property values, the next task is to assess the potential impact of the proposed development on property values. The second section of this thesis, comprising this chapter and chapters five and six, examines the various approaches that have been taken to property value assessment within EIA, with a view to ascertaining whether it is possible to devise a suitable quantitative methodology for carrying out property value assessment within the Irish EIA system. In this regard, this chapter examines the various approaches that may be taken to property value assessment in EIA, with particular emphasis on quantitative approaches. The chapter also examines current practice in relation to property value assessment as part of the EIA systems of Ireland and various other countries such as the UK, The Netherlands, the USA, Canada and Australia.

4.2 VARIOUS APPROACHES TO ASSESSMENT

4.2.1 Overview

Assessment methods in EIA can be of various types, including simple or complex, formal or informal, qualitative or quantitative[1]. Barrow (1997) states that ideally "assessment methods and techniques should be standardised and consistent, replicable and adaptable" and "accurate, reliable, cheap, not too demanding of manpower and expertise, and fast" [2]. It is of paramount importance that the assessment method chosen relates to the task in hand and to the resources available (such as time, data,

1 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 140.

2 Barrow, C. J. (1997), *Environmental and Social Impact Assessment - An Introduction*, Arnold, UK, p.134.

range of experience, etc.). Many of the assessment methods used in EIA were developed for other tasks and have been adapted for EIA.

Glasson et al (1999) state that "in practice, there has been a tendency to use the less formal predictive methods of assessment, and especially expert opinion"[3]. The author's research findings concur with this view in relation to property value assessment within EIA in both Ireland and the UK.

4.2.2 Simple Assessment Methods

Glasson et al (1999)[4] assert that simple assessment methods need not be inappropriate nor need they be applied uncritically or in a simplistic way. This is illustrated by the five-stage approach advocated by Lee (1987)[5]:

(1) A single expert may be asked for a brief, qualitative opinion; or
(2) The expert may also be asked to justify that opinion (i) by verbal or mathematical description of the relationships he has taken into account and/ or (ii) by indicating the empirical evidence which supports that opinion; or
(3) As in (2), except that opinions are also sought from other experts; or
(4) As in (3), except that the experts are also required to reach a common opinion, with supporting reasons, qualifications, etc.; or
(5) As in (4), except that the experts are expected to reach a common opinion using an agreed process of consensus building (e.g. based on "Delphi" techniques).

The Delphi technique involves asking each of a group of experts for his/her opinion about a particular issue. In the context of property value assessment, this involves asking each expert for his/ her opinion about how the proposed development will affect property values. The values chosen are then circulated with that member's explanation for his/her choice. After seeing these options, the experts are then asked to

3 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 137.

4 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 137.

reconsider their estimates and to come to a new decision. Ideally, each successive round should bring the values closer together until they cluster tightly around a mean value. Normally members of such a group are not assembled, or, if they are, then the individual estimates are communicated in writing and not orally. This prevents direct confrontation between the experts and helps to prevent any one person from dominating the group.

Sections 4.2.3 and 4.2.4 examine more sophisticated approaches to property value assessment that may be applied in EIA.

4.2.3 Economic Valuation Techniques

In some of the more well-developed and progressive EIA systems, economic analysis is becoming increasingly important as a planning and evaluation tool in EIA. James (1994)[6] states that, although the main purpose of economic analysis within EIA is to assess the efficiency with which resources are used, that the techniques can also be applied to other matters of concern in EIA, such as the evaluation of indirect and secondary impacts. In this regard, economic valuation techniques could be used to assess the potential impact of a proposed development on surrounding property values.

Economic valuation techniques were developed partly in response to the difficulties experienced in placing monetary values on environmental intangibles in Cost-Benefit Analysis (CBA). The techniques endeavour to place monetary values on environmental intangibles through the measurement of preferences about the environment. Morgan (1998)[7] states that economists have had particular regard to the concepts and methods of welfare economics in the development of economic valuation techniques.

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5 Lee, N. (1987), *Environmental Impact Assessment: A Training Guide*, Occasional Paper 18, Department of Town and Country Planning, University of Manchester, UK.

6 James, D. (1994), *The Application of Economic Techniques in Environmental Impact Assessment*, Kluwer Academic Publishers, The Netherlands, p. 2.

Markandya and Richardson (1992) state that the approaches to economic valuation can be broadly classified as follows:

1. Those based on direct and indirect market information, such as property values, wage rates, expenditure on related goods, etc.;
2. Those based on stated preferences in the absence of markets, as expressed through questionnaires or through public or charitable contributions;
3. Those based on dose-response data linking environmental changes to pollutants[8].

The purpose of each of the above approaches is to elicit individual values, as expressed in terms of willingness to pay for an environmental improvement, or willingness to accept compensation for an environmental deterioration. However, Markandya and Richardson (1992)[9] state that in the first two approaches, where market information is sought, or where stated preferences are sought in the absence of markets, that the link between willingness to pay and the measured value is much clearer than it is in the third case, where the method relies much more on scientific and engineering data.

The economic valuation technique that is of relevance to this study is the Hedonic Pricing Method. The hedonic pricing method is a well-established indirect economic valuation technique that is based on the premise that environmental factors will influence the market price of associated goods. As many aspects of the environment have no established market price, the hedonic pricing method uses surrogate market techniques[10] to estimate an implicit value for an unmarketed good. In practice, by far the most common application of the hedonic pricing method is to the property

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7 Morgan, R. A. (1998), *Environmental Impact Assessment – A Methodological Perspective*, Kluwer Academic Publishers, The Netherlands, p. 227.

8 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 142.

9 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 142.

10 Many aspects of the environment have no established market price so surrogate market techniques use an actual market price (e.g. property values) to estimate an implicit value for an unmarketed good (e.g. air pollution).

market[11], but hedonic price equations have also been estimated for labour (the hedonic wage approach), agricultural commodities, automobiles and wines[12].

With regard to property, the hedonic pricing method uses land/ property values to estimate an implicit value for an unmarketed good, such as environmental quality, through the observed behaviour of individuals in the property market. The hedonic pricing method is examined in detail in Section 5.2.

Two on-line databases containing details of empirical studies which have been undertaken world-wide on the economic valuation of environmental benefits and costs have recently been developed. They are the Canadian Environmental Valuation Resource Inventory[13] and the New South Wales Environment Protection Authority's Envalue database[14]. Also, the Department for Environment, Food and Rural Affairs in the UK[15] recently developed a database which contains details on all of the studies undertaken in the United Kingdom which have placed monetary valuations on environmental benefits and costs. These databases have been developed to assist those involved in environmental impact assessment, cost-benefit analysis and project appraisal to incorporate monetary values for environmental benefits and costs into these processes. A review of the Canadian and Australian databases revealed that the methods used for property value assessments were the Hedonic Pricing Method and the Benefits/ Costs Transfer Method (referred to in Section 4.2.4). With the exception of single studies undertaken in The Netherlands, Norway, Finland and New Zealand, the remainder of the property value studies that were referred to were undertaken in the USA, Canada, Australia and the UK.

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11 Kerry Turner, R., Pearce, D. & Bateman, I. (1994), *Environmental Economics - An Elementary Introduction*, Harvester Wheatsheaf, New York, p. 120.

12 Haab, T. C. & McConnell, K. E. (2002), *Valuing Environmental and Natural Resources – The Econometrics of Non-Market Valuation*, Edward Elgar Publishing Limited, UK, p. 245.

13 Environmental Valuation Resource Inventory at www.evri.ec.gc.ca/evri/.

14 The New South Wales Environment Protection Authority's Envalue at www.epa.nsw.gov.au/envalue/.

15 Environmental Valuation Source List at www.defra.gov.uk/environment/economics/evslist/.

4.2.4 Predictive Approaches Based on Extrapolative Methods

Another possible approach to property value assessment in EIA is the use of predictive approaches which use extrapolative methods such as analogies (i.e. transferring experience from comparative situations elsewhere to the study in hand). Glasson et al (1999)[16] state that analogue models can be developed from site visits, literature searches, or the monitoring of similar projects. Expert opinion based on previous relevant experience may also be used. The Benefit/ Cost Transfer Method is an example of such an approach. This method is examined in detail in Section 5.4.

The remainder of this chapter examines how property value assessment is dealt with within the EIA systems of Ireland, the UK, The Netherlands, the USA, Canada and Australia.

4.3 Property Value Assessment in the Irish EIA System

The author's research demonstrates that the assessment of 'impacts on property values' in all of the EIS's submitted in Ireland during the ten year review period was qualitative. Only three of the 148 EIS's (2.03%) submitted during the ten year review period that considered the likely impact of the proposed development on property values, attempted to quantify the potential impact. However, impact quantification in these three EIS's was based on expert opinion as opposed to the use of a quantitative approach.

Roger's view concurs with the author's findings. Rogers (1992) stated that "the methodology used [in Irish EIS's] to collectively summarise/ interpret the impact data provided by the relevant techniques rarely goes above the level of a descriptive checklist, i.e. one which identifies and categorises the impacts, but does not quantify, even in relative terms, the effect of each individual impact on the existing environment"[17]. In this regard,

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16 Glasson, J., Therivel, R. & Chadwick A. (1999), *Introduction to Environmental Impact Assessment* (2nd Edition), UCL Press, London, p. 136.

17 Rogers, M. (1992), Pricing the Environment, *Engineers Journal Divisional Report*, April, 52-55, p. 52.

Rogers refers to effects on property values as one such impact which is rarely quantified. However, it must be noted that Roger's statement relates solely to Irish EIS's for highway projects, whereas the author's research relates to all of the EIS's submitted in Ireland during the ten year review period (which covers many different types of development projects).

The treatment of property value assessment varies considerably in the 145 EIS's that did not quantify the potential impact of the proposed development on property values. It ranges from one sentence (such as "it is not expected that the proposed development will have any negative impact on property values" or "the proposed development is expected to have a significant positive impact on property values in the vicinity") to a detailed description of the property characteristics of the area and the likely effects of the proposed development on all types of properties, which may extend to in excess of five pages in some cases. On this subject, Mr. Conor Skehan expressed the view[18] that the issue of property values is superficially treated in a significant number of EIS's being submitted in Ireland.

The qualitative assessment of the potential impact of proposed developments on property values has improved somewhat in recent years. Fifteen of the 148 EIS's specifically refer to the opinion of a local estate agent(s) on the likely effects of the proposed development on property values in the locality. Two of the EIS's submitted in 1995 (No.'s 506 and 528) include a one page report[19] from a local estate agent who was enlisted as a property consultant to provide an objective assessment on the potential impact of the proposed development on residential property and agricultural land values in the respective areas. These EIS's relate to the extension of two gravel pits for Readymix (Manufacturing) Ltd., one located in County Kildare and the other in County Kilkenny. The main consultant for both was Frank L. Benson & Associates, Chartered Town Planners. The property value assessments were undertaken by Ferris

18 Interview with Mr. Conor Skehan, Director of CAAS Environmental Services Limited.

19 Attached in appendix form to the main EIS.

O'Reilly Auctioneers Limited and McCreery Auctioneers Limited respectively. In each case, the assessment was based on the following:

- The personal knowledge of the estate agent of the property market in the relevant area;
- A visual survey of the property and its environs, including a distribution survey of private dwelling houses in the vicinity;
- In-house market data; and
- A review of the description of the proposed development and the specialist consultants' reports pertaining to dust, noise and landscape impacts[20].

In each case, the estate agents provided a brief qualitative assessment of the likely impacts of the proposed development on property values in the respective areas. No quantification of the potential impact was provided.

One other EIS that was submitted during the review period (EIS No. 876) incorporated a statement from a local property consultant under the section on Socio-Economic Effects. This EIS was submitted to Cork City Council in 1997 for the proposed development of an indoor sports centre and swimming pool at University College Cork. The main consultant for the EIS was Billy Wilson & Associates, Architects. In two brief paragraphs, the property consultant, John Cohalan of Cohalan Downing Associates, described the residential properties that were likely to be immediately affected by the proposed development and concluded that there would be no effect on value[21].

As afore-mentioned, only three of the 148 EIS's submitted during the ten year review period that considered 'impact on property values', attempted to quantify the potential impact of the proposed development on property values in the locality. However, two of these EIS's relate to separate planning applications for the same development. These EIS's (No.'s 102 and 161) were submitted to Clare County Council in 1990 and 1991 in support of separate planning applications for the restoration of a derelict castle and the development of a hotel, conference centre and golf course

[20] Based on a report from John O'Reilly Auctioneers, attached in appendix form to EIS No. 506.

[21] Section 8.22 of EIS No. 876.

at Clenagh, Newmarket-on-Fergus, Co. Clare. The main consultant for the EIS was Uel Weir, Chartered Architects, and the section on Economic Impacts (from which the following extract is taken) was prepared by K.P. Power, an economist.

The relevant extract regarding 'impact on property values' is:

> *"Property values will rise as a result of the public works project and proximity to the hotel complex. Local estate agents consider the effect of similar projects is in the region of 8% growth per annum"*[22].

The wording of the above extract was identical in both of the EIS's submitted. However, the EIS's provided no information with regard to who the local estate agents were or what "similar projects" were referred to in arriving at a figure of 8% per annum.

The other EIS (No. 740) which attempted to quantify the potential impact of the proposed development on property values was submitted to Dundalk UDC in 1997. It relates to the development of a multiplex cinema, three retail warehouses, restaurant and car parking at Hill Street, Dundalk, Co. Louth. The main consultant was Manahan & Associates, Chartered Town Planners. Three pages of the EIS were dedicated to the issue of the potential impact of the proposed development on property values and the view expressed was that the proposed development was likely to have a beneficial effect on property values in the vicinity of the proposed development. It stated that this view was based on (1) the opinion of local estate agents, P. B. Gunne Ltd. and (2) experience drawn from similar developments in Britain. However, no details were provided on the British developments that were referred to. A summary extract from the EIS regarding 'impact on property values' is as follows:

> *"In summary, it can be said that the current condition of the site is having a negative effect on both commercial and residential property values in the vicinity of the site. The effect of a vacant and disused site to the rear of the properties on Hill Street and the Avenue Road is to suppress residential property values by as much as 10 per cent. P. B. Gunne Ltd. estimate that the increase*

[22] Extract from Section 4.0 Secondary Economic Benefits of EIS No. 102 & EIS No. 161.

in residential property values as a result of the proposed development would be 5 per cent. The absolute increase would therefore be 15 per cent. With regard to commercial property, the current condition of the site results in values being suppressed by 5 per cent. The development should increase values by 3 per cent, to give an absolute increase of 8 per cent"[23].

In both of the above cases, the assessment of the potential impact of the proposed development on property values was based on the opinion of a local estate agent(s) and on experience drawn from similar type developments. Despite the fact that the potential impacts were expressed as specific percentages, the results were not obtained through quantitative analysis.

In conclusion, even though the qualitative assessment of the impacts of proposed developments on property values in Irish EIS's has improved somewhat in recent years, it still does do not go beyond the second stage of the five-stage approach advocated by Lee (as described in Section 4.2.2), and as such, there is considerable scope for improvement.

4.4 PROPERTY VALUE ASSESSMENT IN OTHER EIA SYSTEMS

4.4.1 Selected Countries

The EIA systems of the UK, The Netherlands, the USA, Canada and Australia were examined to ascertain how property value assessment is dealt with within the EIA system of each country. The UK was selected because its EIA system is broadly comparative to the Irish EIA system. The other four countries were selected due to the fact that their EIA systems are generally regarded as being the most well-developed and progressive in the world[24], and therefore, it was probable that if quantitative approaches to property value assessment were being employed in EIA, that they were being used in these countries.

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[23] Section 4.12.5 Summary of EIS No. 740.

[24] Barrow, C. J. (1997), *Environmental and Social Impact Assessment - An Introduction*, Arnold, UK, p.170.

As the EIA system in each of the above countries is quite different, the author proposes to deal with the findings from each country separately.

4.4.2 The UK

The findings for the UK were very similar to those detailed in Section 4.3 for Ireland. A review of the sample of UK EIS's held at the EIA Centre at the University of Manchester revealed that property value assessments were of a qualitative nature. A number of the EIS's referred to the opinions of local estate agents with regard to the likely impact of the proposed development on property values in the area. In some EIS's, reference was made to the results of previous property value studies undertaken outside the ambit of the EIA process.

4.4.3 The Netherlands

Mr. J. J. de Boer, Head of the EIA Section in the Ministry of Housing, Physical Planning and Environment informed the author that economic or socio-economic effects are not legally required to be addressed in the EIA process in The Netherlands, and that such effects are taken into account elsewhere in the decision-making process. This viewpoint was re-iterated by the Commission on EIA. In this regard, it is evident that The Netherlands have interpreted the requirements of the EC Directive on EIA differently from their Irish counterparts.

However, since the early 1990's, the public sector have undertaken a very limited number of Economical Impact Assessments in conjunction with EIA's for very large and complex development projects. Economical Impact Assessments were carried out for Schiphol Airport (Amsterdam) and Zestienhoven Airport (Rotterdam). The findings of these assessments were presented in Economic Effect Reports. An examination of these reports revealed that while they provided considerable detail on the potential changes in land-use patterns, they did not include an assessment of the likely impacts of the proposed developments on property values.

4.4.4 The United States of America

In the sample of 20 US EIS's reviewed at the EIA Centre at the University of Manchester, the potential impact of the proposed development on property values was only addressed in the EIS's that related to very large and complex developments, such as major road projects. This can be attributed to the fact that the US EIA system includes a very comprehensive scoping procedure with provision for significant public involvement. Therefore, any public concerns with regard to property values would be dealt with at the scoping stage or in the draft EIS, and the topic would only be included in the final EIS if the impacts were likely to be very significant. One of the EIS's reviewed indicated that an assessment of the likely impact of the proposed development on property values using the Benefits/ Costs Transfer Method (as detailed in Section 5.4) had been undertaken at the draft EIS stage. However, the impacts were not considered significant enough to be included in the final EIS[25]. In a number of the other EIS's reviewed, the qualitative assessment made reference to the fact that compensation for property devaluation would be incorporated into the cost-benefit analysis for the project.

4.4.5 Canada

The Federal Environmental Assessment Review Office[26] informed the author that an assessment of the potential impact of a proposed development on property values is very rarely undertaken as part of the federal EIA process. They stated that only very significant impacts are addressed in the final EIS as they have very stringent screening and scoping procedures. The Federal Environmental Assessment Review Office provided detailed information on two EIA reviews that considered the potential impact of increased air traffic on surrounding property values. These related to the Vancouver International Airport Parallel Runway Project (1991) and the Air Traffic Management Project in Southern Ontario (1993).

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25 Santa Barbara County (1991), *Final EIS for Phase I of Southern California Edison's Proposed Electric Transmission Line between Goleta and Gaviota, USA.*

26 Information supplied by Ms. Carmen Drouin of the Federal Environmental Assessment Review Office, Canada.

The EIA for the Vancouver International Airport Parallel Runway Project incorporated a very detailed quantitative assessment, using the Hedonic Pricing Method, on the potential impact of the project on surrounding residential property values. The Hedonic Pricing Method is detailed in Section 5.2. A working paper on the potential impact of aircraft noise at Vancouver International Airport on property values[27] was prepared, and this was used as a reference document in the EIA process. However, the treatment of the topic in the final EIS is very brief, and the Report of the Environmental Assessment Panel merely states that "the people affected will suffer measurable economic loss through reduction of their property values"[28] and recommends that possible compensation options are explored.

The EIA for the Air Traffic Management Project in Southern Ontario adopted a different approach. As an airport had been in existence at this location for the previous forty years, the reviewers examined property market transactions over this period in an attempt to establish how the intensification of activities at the airport and growth in air traffic had impacted on property values in the locality. They concluded that there did not appear to be any significant negative impact upon residential development or on new or resale housing prices in the areas affected by relatively high levels of aircraft noise. However, the cost-benefit analysis that accompanied the EIA provided for four categories of noise costs that were related to property values. These were as follows: Property Depreciation (for those who moved out of the neighbourhood naturally or induced by the aircraft noise); Transaction Costs (costs associated with moving such as legal and real estate fees, removal costs, etc. for those who decided to move due to noise); Lost Consumer Surplus (loss in utility from their attachment to the community or their own home); and Noise Annoyance Costs (for those who remained in the area with increased noise exposure experience and increased noise annoyance; these costs were estimated based on the imputed property depreciation). Property

[27] Hamilton, S. W. & Uyeno, D. (1990), *Vancouver International Airport Impact of Aircraft Noise on Property Values*, Prepared for Transport Canada, Airside Capacity Enhancement Project.

[28] Federal Environmental Assessment Review Office (1991), *Report of the Environmental Assessment Panel on Vancouver International Airport Parallel Runway Project.*

depreciation costs were calculated by reference to the number of houses affected and the probable depreciation based on the opinions of local estate agents.

Each of the provincial governments in Canada have separate, and widely differing, EIA processes for projects under their own jurisdictions. On contacting the Ministry of the Environment for each of the provincial governments, the author was informed that in jurisdictions where the EIA process is very similar to the federal Environmental Assessment and Review Process, that it would be extremely rare for the potential impact of a proposed development on property values to be assessed as part of the EIA process, as potential property value impacts are usually addressed within the compensation packages for the proposed projects. However, in others provinces, assessments on the potential impact of proposed developments on property values may be addressed in the EIA process in the case of large development projects such as major roads, landfill sites, quarries, rotary kilns, etc. The Environmental Assessment Branch of the Ministry of Environment and Energy in Ontario[29] provided information on property value assessment methods that had been employed in the EIA process in Ontario. They informed the author that variations of two principal methods had been used by proponents in EIA's and that no one method was preferred. The methods are the 'Before and After' Study Method and the Benefits/ Costs Transfer Method, which are detailed in Sections 5.3 and 5.4 respectively.

4.4.6 Australia

Again, the scoping procedure in the Australian EIA system, prevents the potential impact of a proposed development on property values being assessed except where such impacts are considered to be very significant. The only Australian EIS that the author detected which included a quantitative assessment on the potential impact of a proposed development on property values was for the Third Runway at Sydney (Kingsford Smith) Airport. In this case, a very comprehensive assessment

of the potential impacts on residential and other property values was undertaken using the Hedonic Pricing Method. This Method is detailed in Section 5.2. A working paper on the potential impact of the proposed development on property values[30] was prepared to supplement the draft EIS. In the final EIS, nine pages were attributed to the potential impacts of the proposal on property values in the locality.

4.4.7 Other EIA Systems: Overall Findings

The author's research revealed that property value assessment is considered within the EIA systems of the UK, the USA, Canada and Australia and that quantitative approaches to property value assessment are employed within EIA in the USA, Canada and Australia. However, due to the extensive screening and scoping procedures adopted in the American, Canadian and the Australian EIA systems, the potential impact of a proposed development on property values is generally only considered in the final EIS if the impact is likely to be very significant. For this reason, only a small number of EIS's were identified that used quantitative approaches in assessing the impact of the proposed development on property values. The principle quantitative approaches that were employed were the Hedonic Pricing Method, and variations of the 'Before and After' Study Method and the Benefits/ Costs Transfer Method.

4.5 CONCLUSION

Property value assessment within the Irish EIA system is of a qualitative nature. Only three of the 148 EIS's (2.03%) submitted during the ten year review period that considered the likely impact of the proposed development on property values, attempted to quantify the potential

[29] Information supplied by Mr. Derek Doyle, Director of the Environmental Assessment Branch of the Ministry of Environment and Energy in Ontario.

[30] Kinhill Engineers Pty. Ltd. (1990), *Working Paper on the Impact on Property Values*, Prepared as part of the Environmental Impact Statement for the Third Runway Proposal for Sydney (Kingsford Smith) Airport.

impact. However, impact quantification in these three EIS's was based on expert opinion as opposed to the use of a quantitative approach.

Even though the qualitative assessment of the impacts of proposed developments on property values in Irish EIS's has improved somewhat in recent years, it still does do not go beyond the second stage of the five-stage approach advocated by Lee (as described in Section 4.2.2), and as such, there is considerable scope for improvement.

A review of current practice in the EIA systems of the USA, Canada and Australia revealed that these countries use more sophisticated methods of property value assessment than those employed in the Irish EIA system. The principle quantitative approaches used are the Hedonic Pricing Method, and variations of the 'Before and After' Study Method and the Benefits/ Costs Transfer Method. These quantitative approaches are examined in detail in Chapter 5.

CHAPTER FIVE

Quantitative Approaches to Property Value Assessment

CHAPTER FIVE

QUANTITATIVE APPROACHES TO PROPERTY VALUE ASSESSMENT

5.1 INTRODUCTION

This chapter examines the quantitative approaches that have been developed to assess the impact of some external factor or development on property values. The Hedonic Pricing Method is dealt with in considerable detail as it has been extensively applied in property value studies undertaken world-wide. The other methods that are examined are the 'Before and After' Study Method and the Benefits/ Costs Transfer Method. As detailed in Chapter 4, these methods have been employed to a limited extent in EIA.

5.2 THE HEDONIC PRICING METHOD

5.2.1 Principle of the Hedonic Pricing Method

The hedonic pricing method is a well-established indirect economic valuation technique which uses surrogate market techniques. With regard to property, the method uses land/ property values to estimate an implicit value for an unmarketed good, such as environmental quality, through the observed behaviour of individuals in the property market.

The hedonic pricing method is derived from consumer theory[1]. Powe et al (1995)[2] state that in the case of residential property, consumer theory postulates that the purchase price which a potential buyer is willing to pay is dependant upon the existence and level of a wide range of housing attributes including:

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1 Lancaster, K. J. (1966), A New Approach to Consumer Theory, *Journal of Political Economy*, Vol. 74, 132-157.

2 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147, p. 138.

1. Structural characteristics such as plot size; number of rooms; garage space; central heating; structural integrity; etc.
2. Local Socio-Economic and Public Sector characteristics such as unemployment rate; racial composition; social conditions; wage differentials; quality of schools; local taxes; etc.
3. Environmental and Neighbourhood characteristics such as landscape; wildlife; tree cover; air quality; noise; water frontage; etc.
4. Locational or Accessibility characteristics such as access to shops; mainline rail links; major roads; urban centres; etc.
5. Property rights or legal constraints regulating the use of the property.

Each of the above variables, with the exception of the environmental variables, are to some extent, quantifiable. The basic assumption of the hedonic pricing method is that the price differential, arrived at after all other variables except for environmental quality have been controlled for, reflects a purchaser's valuation of the environmental quality. With the use of appropriate econometric techniques, the method attempts to (a) identify how much of a price differential is due to a particular environmental difference between properties, and (b) infer how much people are willing to pay for an improvement in the environmental quality. In order to do this, all of the variables relevant to each property have to be included in the analysis. Hence such studies usually involve a number of property-describing variables, a number of neighbourhood variables, a number of locational and accessibility variables and a number of environmental variables which are relevant to the particular study.

5.2.2 Application of the Hedonic Pricing Method

The hedonic pricing method was first applied to environmental valuation by Ridker and Henning in 1967 to determine the effect of changes in the levels of air pollution on residential property values in the USA. Since then, the method has been widely applied in the United States, Australia and Canada; and to a more limited extent in the UK. The method has been little employed in other European countries. At the time of writing, single hedonic pricing

studies had been undertaken in The Netherlands, Norway and Finland[3]. To date, no hedonic pricing studies have been undertaken in the Republic of Ireland. A review of the Canadian and Australian environmental valuation on-line databases revealed that the majority of hedonic pricing studies were undertaken in the 1970's and 1980's, and that only a very limited number of studies have been carried out in the 1990's. Appendix No. 2 contains a comprehensive list of the hedonic pricing studies that have been undertaken world-wide.

The hedonic pricing method has been primarily applied to the residential property market, but there have been a small number of studies carried out which have attempted to apply the technique to the commercial property market [Antwi (1995)[4] and Damm et al (1980)[5]]. Section 5.2.13 details the application of the hedonic pricing method to the commercial property market.

Garrod and Willis (1999) state that the hedonic pricing method has been used to examine a wide variety of issues, including:

- Environmental Risk – Brookshire et al (1985) examined the effect on property values of information on different levels of earthquake damage in residential areas of Los Angelus and San Francisco.
- Landscape and Water Quality
- Environmental Protection – Frech and Lafferty (1984) investigated the economic effects on house prices of a policy which had the power to veto development.
- Urban Amenity – Wabe (1970) investigated the effect of proximity to a green belt on residential property values in London.

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3 Opschoor (1986) assessed the impact of noise on residential property values in the vicinity of Amsterdam Airport in the Netherlands and Hoffman (1984) investigated the effect of aircraft noise on residential property values in Norway. Neither of these reports were published. Laakso (1992) assessed the impact of the Helsinki Metro on residential property values; this study is referred to elsewhere in the text.

4 Antwi, A. (1995), *Estimating the Commercial Property Impacts of Urban Transport Investments Using Hedonic Analysis*, Paper presented at the Pacific Asia Property Research Conference, Singapore, April.

5 Damm, D., Lerman, S. R., Lerner-Lam, E. & Young, J. (1980), Response of Urban Real Estate Values in Anticipation of the Washington Metro, *Journal of Transport Economics and Policy*, September, 315-336.

- Agricultural Land Values – Miranowski and Hammes (1984) and Evrin and Mill (1985) used the hedonic pricing technique to examine the effects of soil quality and erosion on land values, and Palmquist and Danielson (1989) investigated the effects of erosion control and drainage on agricultural land values.
- Air Pollution – Numerous studies have investigated the effect of air pollution on property values.
- Noise – Studies usually relate to aircraft or road traffic noise.
- Social Factors – The hedonic pricing technique has been used to investigate social issues such as the impact of racial discrimination in the Boston housing market (Schafer 1979) and the effect of schools on house prices (Jud and Watts 1981)[6].

To this list, the author would add hedonic pricing studies undertaken for the purpose of assessing the effect of investment in transport infrastructure on residential and commercial property values, such as the study undertaken by Antwi (1995)[7] to assess the effect of the South Yorkshire Supertram on residential and commercial property values in Sheffield.

The principle studies, undertaken in countries other than the UK, which were referred to in the course of this research were: Damm et al (1980)[8] who examined the effect of the anticipation of the implementation of the Metro on property values in Washington D. C.; Kohlhase (1991)[9] who assessed the impact of proximity to toxic waste sites on property values in Texas; Laakso (1992)[10] who assessed the impact of the Helsinki Metro on property values in

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6 A summary of p. 95-101 in Garrod, G. & Willis, K. G. (1999), *Economic Valuation of the Environment – Methods and Case Studies*, Edward Elgar Publishing Limited, UK.

7 Antwi, A. (1995), *Estimating the Commercial Property Impacts of Urban Transport Investments Using Hedonic Analysis*, Paper presented at the Pacific Asia Property Research Conference, Singapore, April.

8 Damm, D., Lerman, S. R., Lerner-Lam, E. & Young, J. (1980), Response of Urban Real Estate Values in Anticipation of the Washington Metro, *Journal of Transport Economics and Policy*, September, 315-336.

9 Kohlhase, J. E. (1991), The Impact of Toxic Waste Sites on Housing Values, *Journal of Urban Economics*, Vol. 30, 1-26.

10 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

Helsinki, Finland; Des Rosiers et al (1996)[11] who examined the link between property values and proximity to different sized shopping centres in Quebec, Canada; and So et al (1997)[12] who examined the influence of transport on house prices in Hong Kong.

Relative to the USA, the hedonic pricing method has been little employed in the UK. However, over the last ten years or so, there has been growing interest in this area and some studies have been carried out. The principle UK studies which were referred to in the course of this research were: Pennington et al (1990)[13] who examined the link between property values and the noise nuisance generated by operations at Manchester International Airport; Garrod and Willis (1992)[14] who assessed the impact of proximity to open water on property values in Gloucestershire; Garrod and Willis (1992)[15] who examined the impact of proximity to forests on property values in rural areas; Brooke (1994)[16] who examined the effect on property values of the siting of hazardous facilities in the Heysham area of Lancashire; and Forrest et al (1995)[17] who assessed the impact of the Metro Link on house prices in the Greater Manchester area.

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11 Des Rosiers, F., Lagana, A., Thériault, M. & Beaudoin, M. (1996), Shopping Centres and House Values: An Empirical Investigation, *Journal of Property Valuation & Investment*, Vol. 14, No. 4, 41-62.

12 So, H. M., Tse, R. Y. C. & Ganesan, S. (1997), Estimating the Influence of Transport on House Price: Evidence from Hong Kong, *Journal of Property Valuation and Investment*, Vol. 15, No. 1, 40-47.

13 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

14 Garrod, G. D. & Willis, K. G. (1992), Valuing Goods' Characteristics: An Application of the Hedonic Price Method to Environmental Attributes, *Journal of Environmental Management*, Vol. 34, 59-76.

15 Garrod, G. D. & Willis, K. G. (1992), The Environmental Economic Impact of Woodland: A Two Stage Hedonic Price Model of the Amenity Value of Forestry in Britain, *Applied Economics*, 24, 715-728.

16 Brooke, M, (1994), *What is the Effect on Local House Prices of the Siting of Hazardous Facilities? A Hedonic Price Study with reference in particular to the area surrounding Heysham in Lancashire*, Unpublished Dissertation, Department of Economics, University of Cambridge, Cambridge, UK.

17 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

5.2.3 Methodology

The identification of a property price differential due to a difference in environmental quality is usually done by means of a multiple regression analysis. This is an econometric technique which seeks to link the value of a number of independent variables to a further variable whose value is supposedly dependent on them (the dependent variable). In this case, the property price is the dependent variable and a vector of the property, neighbourhood, locational and accessibility and environmental variables are the independent variables. The intention is to produce a model, or equation, which will explain the relationship between the dependent variable and the independent variables.

Pearce and Markandya (1989)[18] state that if any variable that is relevant is excluded from the analysis then the estimated effects on property value of the included variables could be biased. The bias may be upwards or downwards depending on how the included and excluded variables relate to each other and to the value of the property. On the other hand, if an irrelevant variable is included in the analysis, then no such systematic bias results[19]. Therefore, it is extremely important when carrying out a hedonic price analysis, to include as many variables relevant to the property as possible.

Data are taken either on a small number of similar properties over a period of years (time series), or on a larger number of diverse properties at a point in time (cross section), or on both (pooled data). In practice almost all property value studies have used cross section data[20], as controlling for other influences over time is much more difficult.

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18 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 25.

19 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

20 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 143.

In strict econometric terms, the hedonic pricing method comprises of three stages. These are as follows:

Stage One

The first stage in the hedonic pricing method is to estimate an equation of hedonic form, such as:

Property price = f(property variables, neighbourhood variables, locational and accessibility variables, environmental variables)

where f(...) simply means 'is a function of'.

Economic theory fails to indicate any particular form as being appropriate, as the "true" functional form is unknown[21]. Statistical criteria are generally used to select the preferred form of the equation. Most studies have found that a linear form was unsatisfactory as it implies that property values fall or rise by a constant amount relative to changes in environmental quality. In practice, however, as environmental quality changes, property values may fall or rise by decreasing or increasing amounts. Therefore, most studies use some type of non-linear form[22] such as the semi-log or inverse semi-log forms. Markandya and Richardson (1992)[23] state that the choice of functional form can result in significant differences in the estimated benefits and they assert that the accepted 'best' practice is to use the Box-Cox transformation[24], allowing the form to be determined by the data.

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21 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK, p. 19.

22 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

23 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 145.

24 The Box-Cox transformation uses a statistical procedure to test the appropriateness of alternative functional forms. Cheshire & Sheppard (1993) state that although some earlier writers had employed the Box-Cox functional form, it is since Halvorsen and Pollakowski's (1981) contribution that this form has become widely employed in hedonic pricing studies.

As afore-mentioned, the actual specification of the equation is a matter of professional choice, however, a commonly used one is:

$$\ln PP = a\ln PROP + b\ln NHOOD + c\ln ACCESS + d\ln ENV$$

where 'ln' refers to logarithm, PP refers to property price, PROP refers to property variables, NHOOD refers to neighbourhood variables, ACCESS refers to locational and accessibility variables and ENV refers to environmental variables[25].

Stage Two

Stage two of the hedonic pricing method involves undertaking multiple regression analysis to generate coefficients and *t*-ratios for the *a*, *b*, *c* and *d* values contained in the above formula. This entails estimating regression equations in which property value is related to a measure of environmental change and to whatever measures of property, neighbourhood or other locational and accessibility characteristics are being used in the analysis. The coefficient estimated for the environmental variable (*d*) is then used to gauge the valuation attached by the property market to the environmental variable under investigation i.e. to estimate the implicit equilibrium market price (the hedonic price) for the environmental variable.

Stage Three

Stage three is primarily concerned with welfare economics and, as such, is largely irrelevant to this particular study. This stage of the method involves relating the property price to willingness to pay for the environmental improvement. Households differ in income and in preference for environmental quality and empirical studies have shown that generally households with higher incomes are willing (and able) to pay more for a given improvement in environmental quality than those on lower incomes[26]. By inference, due to willingness to pay, an improvement of 'x' amount in say,

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[25] Pearce, D. W. & Kerry Turner, R. (1990), *Economics of Natural Resources and the Environment*, Harvest Wheatsheaf, New York, p. 144.

[26] Pearce, D. W. & Kerry Turner, R. (1990), *Economics of Natural Resources and the Environment*, Harvest Wheatsheaf, New York, p. 146.

environmental quality would have a greater impact on property values in higher income areas than in lower income areas. To take account of this fact, further statistical analysis may be undertaken to estimate the inverse demand function[27] for the environmental quality variable.

Abelson (1996)[28] states that in practice, stage three is rarely undertaken as the resources required are considerable and the benefits small. In lieu of estimating demand functions, implicit price schedules obtained from stage two of the procedure are commonly used as measures of willingness to pay values. He concludes that this is a reasonable approximation when the prices do not vary with environmental quality, when changes in environmental quality are small, or when households are similar.

5.2.4 Theoretical & Practical Difficulties Associated with the Method

Theoretical Assumptions of the Method

There are a number of theoretical assumptions inherent in the hedonic pricing method. Firstly, a basic underlying assumption of the method is that the housing market is in equilibrium, i.e. that there are a continuous choice of houses available on the market, and that there is perfect competition and perfect knowledge within the market. This implies that households have information on all housing alternatives within the housing market and that they are able to adjust their residential location to select the combination of house features (in terms of size, neighbourhood, location and accessibility, and environmental quality) which they most prefer, given the constraints of their income. Given the imperfect nature of the housing market, this assumption of equilibrium is rarely valid.

Furthermore, the assumption of equilibrium would be severely affected if there were mobility restrictions within the housing market. These may be due to supply problems or rationing of property in the public sector (such as a

[27] It is an inverse demand curve/ function because price is a function of quantity demanded.

[28] Abelson, P. (1996), *Project Appraisal and Valuation of the Environment*, Macmillan Press Ltd., London, p. 65.

shortage of local authority houses). This would mean that households could not satisfy their demand for an environmental improvement as there may be no properties available to them in areas of higher environmental quality. This situation would result in the estimates obtained for implicit prices being biased. Also, the assumption of equilibrium fails to take into account that the housing market can be affected by outside influences, such as the Government, who may have a large influence over house prices because of changing tax concessions or interest rate movements.

A further assumption of the method is that households are well informed about environmental quality and the likely effect(s) of changes in pollution levels. In reality, households generally have imperfect information and inaccurate perceptions with regard to pollution levels and their impact. If purchasers are not aware of an environmental disamenity or its health impacts, the estimated implicit price will be an underestimation of the true cost of the environmental disamenity. However, even if households had perfect information about the levels of pollution and their impacts, Balchin et al (1995)[29] feel that it is unlikely that the full effects would be reflected in the housing market as many households would not have a real choice of relocating elsewhere.

However, Abelson (1996)[30] concludes that even if equilibrium conditions do not exist in the housing market, that the hedonic pricing method can still be used as property values can provide rough estimates of implicit prices for changes in environmental quality.

Practical Difficulties with Econometrics

Most empirical studies using the hedonic pricing method have identified difficulties associated with the choice of functional form of the hedonic price

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29 Balchin, P., Kieve, J. & Bull, G. (1995), *Urban Land Economics and Public Policy*, (5th Edition), Macmillan Press Ltd., London, p. 181.

30 Abelson, P. (1996), *Project Appraisal and Valuation of the Environment*, Macmillan Press Ltd., London, p. 65.

equation; the collinearity of independent variables; and the choice of variables to be included in the analysis.

Choice of Functional Form

The problems associated with the choice of functional form have been well-documented in Section 5.2.3.

Collinearity between Independent Variables

It is preferable to include as many property, neighbourhood, locational and accessibility and environmental quality variables as possible in an hedonic pricing analysis. However, this may cause problems of multi-collinearity[31]. This is due to the fact that typically many of the variables of interest are closely correlated, for example, closeness to the central business district and increased levels of air and noise pollution. The data available on each variable is generally not detailed enough to separate out the effects of the variables. In an attempt to overcome this problem, many empirical studies use different statistical model estimations for the various characteristics and based on the results, exclude the characteristics which seem to add little additional insight into understanding the housing market and which, by their exclusion, lessen the problem of collinearity. An alternative approach used in some studies is to include only one measure of say air pollution and use it to pick up the effects of all forms of air pollution on property values, or to use a proxy variable such as income to measure the impact of many socio-economic variables on property values[32].

Choice of Variables to be included in the Analysis

It has been widely observed in the econometric literature, that what may be perceived to be relevant variables are commonly omitted from studies. This may occur due to lack of data concerning some important variable or because

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[31] Multi-collinearity of variables is where two or more variables are not wholly independent but overlap in their effect. This tends to be inherent in many property characteristics.

[32] Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

of the exclusion of some variables for which data were available but which were excluded in an attempt to avoid collinearity-related instability in the hedonic price estimates.

However, despite all of the limitations and practical difficulties associated with the method outlined above, Freeman (1979) argues that the hedonic pricing method is, all things considered, as valuable a technique as any other in economics:

> *"The theory is logical and consistent, but it involves a substantial simplification and abstraction from a complex reality. The assumptions are never completely realised in practice. But this is a dubious test of the validity of any model. It is the nature of models in economics that their assumptions are to some extent unrealistic. The data are inadequate; variables are measured with error; and the definition of empirical variables seldom correspond precisely to the theoretical constructs. But all of these criticisms can be raised against virtually any empirical work in economics. The hedonic technique for estimating benefits seems to pass the appropriate tests about as well, or as poorly, as any empirical technique for estimating such things as demand functions, production functions, consumption functions, and so forth.* [33]"

Hyman (1981)[34] concurs with this view and states that the theoretical validity of the hedonic pricing method in measuring implicit prices for environmental quality is regarded as medium on an interval scale of low to high. In terms of freedom from problems of reliability and bias the method scores highly on a similar scale.

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[33] Quoted in Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK, p. 10.

[34] Hyman, E. L. (1981), The Valuation of Extramarket Benefits and Costs in Environmental Impact Assessment, *Environmental Impact Assessment Review*, Vol. 2, No. 3, 227-258, p. 251.

5.2.5 Review of the Data and Variables Used in Empirical Studies

This section provides an overview of the data and variables used in the empirical studies referred to in this research. However, as the UK housing market is the one that is most comparable to the Irish market in terms of housing preferences and operation of the market, particular emphasis is placed on the methods employed in UK empirical studies as opposed to the American, Canadian, Australian and European studies.

One of the major problems in the investigation and use of hedonic pricing studies is the availability of the substantial amount of data required to carry out such a study. The problem arises in part because of the need for data to be specified and measured in quantitative form. Obviously, the credibility of the results also depends on the quality of data input into the multiple regression analysis equations. However, the character and quality of the data which underpinned the hedonic pricing studies consulted varied markedly. To give an indication: So et al (1997)[35] only used fourteen independent variables to describe the residential properties, which was a relatively small number, but he applied them to 1,234 properties; Damm et al (1980)[36] used twenty-two variables which related to as few as 286 properties for the analysis concerned with single-family dwellings and to 771 properties for the analysis relating to the multi-family dwellings; Pennington et al (1990)[37] used twenty-five variables and related them to 3,472 properties; in contrast, Laakso (1992)[38] used twenty-seven variables relating to 6,700 properties.

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35 So. M., Tse, R. Y. C. & Ganesan, S. (1997), Estimating the Influence of Transport on House Price: Evidence from Hong Kong, *Journal of Property Valuation and Investment*, Vol. 15, No. 1, 40-47.

36 Damm, D., Lerman, S. R., Lerner-Lam, E. & Young, J. (1980), Response of Urban Real Estate Values in Anticipation of the Washington Metro, *Journal of Transport Economics and Policy*, September, 315-336, p. 324.

37 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59, p. 55.

38 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229, p. 221.

Antwi (1995)[39] states that, as is the case in all statistical exercises, the larger the sample, the more the reliability and the credibility of the results improve. The majority of the empirical studies carried out over the past ten years which were referred to in the course of this study, appear to use a substantial number of independent variables and to relate them to a large number of properties.

Apart from information on house prices, all the studies consulted collected data on three aspects of residential property namely, its physical character, the characteristics of the neighbourhood within which it was located and data regarding the location and accessibility of the property relative to key facilities, such as railway stations, shopping centres, employment centres, primary schools, parks, etc. Data was also amassed on the variable under investigation; this was generally an environmental variable or the significance of proximity to a transport facility, such as a railway station.

5.2.6 Property Price Details

Sales v's Rental Evidence

Views differ on whether property sales or rental values should be used in the multiple regression analysis. Pearce & Markandya (1989)[40] state that either may be used but that in general sale prices are more frequently used. They conclude that this is partly due to the fact that more property is owner-occupied in the countries and areas where most hedonic pricing studies have been carried out and partly because rents are often not found to perform as well in such studies. Markandya and Richardson (1992)[41] state that theoretically rental data is better as it gives a clearer indication of willingness to pay for current levels of the environmental attribute whereas sales data

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39 Antwi, A. (1995), *Estimating the Commercial Property Impacts of Urban Transport Investments Using Hedonic Analysis*, Paper presented at the Pacific Asia Property Research Conference, Singapore, April.

40 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

41 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 144.

reflects current levels as well as future expected levels of the environmental attribute. However, they conclude that the rental market in some countries is less perfect than the sales market and that it may be preferable to use sales data. Overwhelmingly, the studies consulted have used sales prices as opposed to rental evidence in their analysis.

Source of Property Price Data

There appears to be three primary sources of sales data used in the empirical studies. These are actual market transaction prices, advertised asking prices and values based on valuations by professional valuers. Accessibility to data appears to determine which of the above three options is used in the analysis.

Adair et al (1996)[42] state that it is preferable to use actual market prices in housing market analysis as they are the outcome of the interplay of economic forces of demand and supply, as determined by buyers and sellers in the open market and therefore, provide the most objective indication of value. All but two of the UK empirical studies referred to, used market transaction prices as opposed to asking prices for residential properties in their analysis. Data on market transaction prices were generally provided by one of the national building societies. In an attempt to exclude transactions that may have taken place at non-market prices, such as intra-family or local authority house sales, both Pennington et al (1990)[43] and Forrest (1992[44] and 1995[45]) eliminated a number of the properties from their analyses for which the recorded sales price differed from the Building Society's own valuation by more than twenty per cent.

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42 Adair, A., Berry, J. & McGreal, S. (1996), Valuation of Residential Property: Analysis of Participant Behaviour, *Journal of Property Valuation & Investment*, Vol. 14, No. 1, 20-35, p. 20.

43 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

44 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK, p. 19.

45 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

Despite the shortcomings of using asking prices in housing market analysis, some of the empirical studies consulted have used them. Antwi (1993)[46] used asking prices in his study of the effect of the South Yorkshire Supertram on property values in Sheffield. This was due to the fact that they were readily available in a monthly publication called 'The Property File: Sheffield'[47] which lists details (such as address of the property and its' main characteristics) and asking prices on all the properties offered for sale by all the estate agents operating in Sheffield. Cheshire and Sheppard (1993)[48] also used asking prices in their housing market analysis in the Reading and Darlington areas. They reported that this was due to the fact that data on market price transactions were not readily available. Due to the stability of the housing market over the study period (1984) they felt that it could be argued that the asking price offered a good approximation of the actual transaction price. However, following statistical tests, they found a mean divergence of five per cent between the asking price and the actual price paid for properties in their study area[49].

A third source of property values is to obtain values for a sample of properties from professional valuers. Although such estimates are bound to have some errors in them, tests carried out by Nelson (1978)[50] in the USA conclude that errors are not too systematic or too significant. However, Mackmin (1985)[51] asserts that valuations are accurate to within five per cent of the actual market

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46 Antwi, A. (1993), *The Impact of New Transport Infrastructure on Land Use and Property Values - Analysis of Theory and Evidence*, Urban Transport Investment Studies, Paper No. 6, School of Urban and Regional Studies, Sheffield Hallam University, Sheffield, UK.

47 Prepared by a company called C.J. Business Services, Sheffield.

48 Cheshire, P. & Sheppard, S. (1993), *Evaluating the Impact of Neighbourhood Effects on House Prices and Land Rents: Results from an Extended Model*, Discussion Paper in Urban and Regional Economics No. 86, Department of Economics, University of Reading, Reading, UK, p.8.

49 Henneberry, J. (1998), Transport Investment and House Prices, *Journal of Property Valuation and Investment*, Vol. 16, No. 2, 144-158, p. 148.

50 Referred to in Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

51 Mackmin, D. (1985), Is there a residential valuer in the house?, *Journal of Valuation*, Vol. 3, 384-390.

transaction price. Adair et al (1996)[52] contest this figure and report that from their research undertaken in the Belfast housing market, it would appear that the ten per cent level provides a more meaningful threshold for valuation accuracy. The author concludes that there has not been sufficient research regarding the accuracy of residential property valuations undertaken to advocate using professional valuations in housing market analysis.

Some of the earlier American hedonic pricing studies, such as that carried out by Ridker and Henning in 1967, used the average or median property price over a census tract[53]. Pearce and Markandya (1989) state that such data have the advantage of 'ironing out' random variations in prices and where the tracts are relatively homogenous they have provided satisfactory working variables[54].

However, more recent studies have tended to obtain data on property market transactions from central registers or directories which contain comprehensive details on all property market transactions within a geographical area[55]; or from tax assessors' records.

5.2.7 Property Characteristics

The property characteristics employed vary from study to study. However, the empirical studies referred to this in this research, all include a number of the following property characteristics:

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52 Adair, A., Berry, J. & McGreal, S. (1996), Valuation of Residential Property: Analysis of Participant Behaviour, *Journal of Property Valuation & Investment*, Vol. 14, No. 1, 20-35, p. 33.

53 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

54 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

55 For example, the LUSK Directory that Damm et al (1980) referred to in their study contained extensive information on recorded transfers of all property in Washington D.C. In addition to the amount of the transaction for a specific property, the date of sale, the mortgage interest rate, the name of the new owner, the local block and lot description, it gave assessment data and land use type.

- House Type (detached; semi-detached; terraced; apartment; bungalow; etc.)
- Tenure (freehold or leasehold)
- Total Floor Area
- Number of Bedrooms
- Number of Bathrooms
- Presence of a Garage
- Presence of a Garden
- Central Heating Type (gas; electric; solid fuel; etc.)
- Plot Size
- Age
- Provision of Off-Street Parking.

Information with regard to the physical characteristics of the various properties is easily quantifiable and the primary information is usually readily available on estate agents detail sheets, in newspaper advertisements or from mortgage acceptance data.

With regard to property characteristics, an area that is often overlooked in empirical studies is the fact that some households may have expended money on measures to alleviate the effects of some forms of environmental pollution, such as installing double glazing to mitigate the effects of noise pollution or installing air filters to alleviate the effects of air pollution. This so-called 'averting behaviour'[56] would enhance the value of a property relative to other properties in the vicinity where such measures had not been carried out. In such circumstances, in order to avoid biasing the estimated implicit price for the environmental variable under investigation, the presence or absence of say double glazing or air filters in a property should be included as a property characteristic.

[56] Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 29.

Use of Dummy Variables

In order to ensure that the data representing the property characteristics is in a form that is suitable for inclusion in the multiple regression analysis, certain variables may need to be input as dichotomous variables, i.e. dummy variables. Dichotomous variables are variables that represent the presence (or absence) of particular features, e.g. a garage. This is necessary in the case of certain variables which are recorded on an interval scale (such as 1 bedroom, 2 bedrooms, 3 bedrooms, 4 bedrooms, etc.), but where it cannot be assumed that the intervals are of equal measures. For example, the presence of four bedrooms in a property does not have twice as much influence on price as that of a two bedroom property. To overcome this problem, affected variables are usually coded with a 1 (to represent the presence of the variable in question) or 0 (absence of variable) for each state that the variable could take. For example, in the case of the number of bedrooms, the value 1 can only appear beside one of the variables (e.g. a three bedroom house would have a 1 beside the 3BED variable and a 0 beside the 1BED, 2BED and say 4BED variables in the analysis). The effect of using such dummy variables is to allow the regression technique itself to estimate the varying influence of say bedroom provision, rather than have this imposed by an interval scale of measurement. In the empirical studies consulted, dummy variables were widely used for variables such as house type; presence or absence of a garage, central heating, garden, double glazing; etc.

5.2.8 Neighbourhood Variables

Most empirical studies have found that the characteristics of the local neighbourhood are of extreme importance to the determination of residential property prices. This includes aspects such as the character of neighbouring houses and households, the quality of the micro-environment and local public goods, localised traffic effects, and the quality of local public services, such as schools. All of the reviewed studies include one or more variables to represent such neighbourhood characteristics. However, despite neighbourhood characteristics being one of the most important characteristics in the

determination of property values, frequently in hedonic pricing studies, appropriate data on neighbourhood characteristics are either not available or imperfect proxies are used.

The principle of stratification of the residential property market is a widely recognised one. However, the definition of the different housing markets or neighbourhoods for the purposes of hedonic pricing analysis causes considerable difficulties due to the fact that residents' perceptions of neighbourhoods vary between different groups because of their different preferences, knowledge, mobility, etc. Adair et al (1994) state that while the identification of localities "is at best notional", "regression modelling works best and achieves the highest levels of explanation in well defined market areas" [57]. Therefore, it is important to attempt to define a set of sub-areas which represent localities or neighbourhoods with similar composition and characteristics within the housing market being analysed. Depending on the form of the available data, a number of different approaches have been used in the empirical studies consulted.

Three of the empirical studies undertaken in the UK that the author consulted, were carried out in the Greater Manchester area [Pennington et al (1990[58]); and Forrest et al (1992[59] and 1995[60])]. In these studies, an ACORN code was used as a measure for the neighbourhood variable for each property. The ACORN code (ACORN is an acronym for A Classification of Residential Neighbourhoods) is assigned by a marketing company called CACI Marketing. Under the ACORN code system, each property is allocated to a census

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57 Adair, A., Berry, J. & McGreal, S. (1994), The Operation and Differentiation of Housing Market Areas, in the *Proceedings of the Cutting Edge Property Research Conference of the RICS*, London, September, 229-245.

58 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

59 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK.

60 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

enumeration district on the basis of its postcode. Using census information, this district is then classified according to neighbourhood type. As each census enumeration district comprises only 100-150 households, it gives a very micro measure of neighbourhood type. Within the framework of the ACORN system, there are thirty-nine possible neighbourhood categories that can be applied to a census enumeration district, such as 'inter-war council estates, old people' (ACORN 20) and 'detached houses, wealthy suburbs' (ACORN 36).

Forrest et al (1992[61] and 1995[62]) used a Parliamentary Constituency Class system as a measure for the neighbourhood variable for each property. Under the Parliamentary Constituency Class system there are a possible nine classes that can be assigned to a neighbourhood, such as 'deprived inner cities' (PC Class 5) and 'older industrial textile towns' (PC Class 2). Forrest claims that this provides a more macro concept of neighbourhood characteristics, as some buyers may be willing to pay more for a property for which the immediate surroundings are ordinary but which is near or adjacent to a high status suburb offering say, good schools and speciality shopping.

However, in the absence of a code system such as the ACORN code system or the Parliamentary Constituency Class system, a common problem encountered is how to partition the area under analysis into neighbourhoods. Inevitably subjective judgements have to be made about the boundaries of each neighbourhood. Once the neighbourhoods are defined, a further problem is how to avoid having to include large amounts of data for each neighbourhood in the analysis. As a possible solution to these problems,

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61 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK.

62 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

Cooley et al (1994)[63] suggests that an experienced local estate agent could define a set of discrete sub-areas (analogous to neighbourhoods) which are relevant for their effect on house prices. Just one variable for each neighbourhood could then be included in the multiple regression equations. Such a variable would represent the neighbourhood characteristics of properties located within those neighbourhoods.

An alternative approach employed in a number of the other empirical studies undertaken in the UK referred to in the course of this study (Cheshire and Sheppard (1993)[64]; and Powe et al (1995)[65]) was to use used ward level data from Census' to allow for neighbourhood variables. Typically this includes such variables as proportion of properties that are owner-occupied, socio-economic grouping, proportions of young children and pensioners; unemployment rate; car ownership; racial composition; and perceived levels of neighbourhood security. However, this approach generally causes difficulties in the multiple regression analysis as many of the variables are inter-related and interpretation of the coefficients of the variables obtained can be very difficult. Positive socio-economic factors such as a high proportion of professionals, high levels of car ownership and low levels of unemployment, are generally to be found in areas with the highest levels of environmental amenity. Similarly, areas with higher unemployment and lower rates of car ownership are generally to be found in the areas with low levels of environmental amenity. Therefore, previous empirical studies have concluded that many of the above-mentioned variables should be omitted from the

63 Cooley, R. E., Pack, A. D., Hobbs, M. & Clewer, A. D. E. (1994), A Genetic Algorithm for Modelling Location Effects on Residential Property Prices, Proceedings of the *Cutting Edge Property Research Conference of the RICS*, September, London.

64 Cheshire, P. & Sheppard, S. (1993), *Evaluating the Impact of Neighbourhood Effects on House Prices and Land Rents: Results from an Extended Model*, Discussion Paper in Urban and Regional Economics No. 86, Department of Economics, University of Reading, Reading, UK.

65 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147.

analysis because of their consequent low explanatory power, or because of problems with multi-collinearity[66].

Another approach is to include a neighbourhood variable for the Local Authority under whose jurisdiction the property is located. Forrest et al (1992[67] and 1995[68]) included such a variable in their analysis; the Local Authority under whose jurisdiction the property was located was determined by postcode. This is particularly pertinent in the UK where each local authority charges a property tax which is based on the value of the property and for which the rates vary from one jurisdiction to the next. The level of property tax charged is seen as being representative to some degree of the level of public services provided within that jurisdiction. This measure has also been extensively applied as a neighbourhood variable in a number of the American studies.

5.2.9 Locational and Accessibility Variables

Locational and accessibility variables represent the proximity or accessibility of the property to facilities such as the nearest railway station; major road; town centre; shopping centre; local shopping facilitates; employment centres; primary school; secondary schools; industrial or business areas; large open space, park or woodlands; sea, river, lake, etc. While proximity to some of the afore-mentioned facilities may positively influence property values, possible environmental disamenity must also be allowed for in the analysis. This may be caused by close proximity to an airport, a major road or railway line which can result in increased air and noise pollution; proximity to an industrial or

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66 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147.

67 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1992), *Railways and House Prices in Greater Manchester*, Working Paper 8, Department of Geography, University of Salford, Salford, UK.

68 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

business area can lead to congestion and proximity to a secondary school can result in increased noise and vandalism.

The UK studies generally use the postcode of the property to generate a relatively precise measure of the location of the property. By using the Post Office Centre Postcode Directory[69], each property within a particular postcode can be narrowed down to being within an area measuring 100 square metres. Distance from key variables relative to the study can then be measured.

In some of the studies referred to, distance of the individual properties from key facilities was measured using Ordnance Survey maps. However, this was a very arduous task and the use of Geographic Information Systems has been advocated so that the distances can be calculated by computer. Kerry Turner et al (1994)[70] states that the use of GIS in hedonic pricing analyses will become more prevalent. The use of GIS can considerably lessen the amount of time spent measuring the distance of properties from key facilities in the study area. Furthermore, the GIS maps can include the contours of hills and valleys so that the computer can calculate exactly what is the specific environment affecting each particular property, e.g. whether a house is directly exposed to the noise of a nearby major road or whether it is shielded by other houses.

5.2.10 Variable under Investigation in the Hedonic Pricing Study

Obviously, the choice of the target variable (the variable under investigation) depends on the nature of the study being undertaken. In the case of empirical studies assessing the impact of changes in environmental quality on property prices, the target variable measured tends to be air pollution; noise nuisance

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[69] The Post Office Central Postcode Directory consists of a single entry data record for each of the 1.6 million postcodes in England and Wales. It includes an eight-figure Ordnance Survey grid reference for the first address in each postcode. This grid reference identifies the location of the property down to within an area of 100 metres square.

[70] Kerry Turner, R., Pearce, D. & Bateman, I. (1994), *Environmental Economics - An Elementary Introduction*, Harvester Wheatsheaf, New York, p. 120.

generated by air, rail or road traffic; or an improvement in recreational amenities. Various measures of the different types of pollution have been used in the empirical studies; this is largely due to the type of data available to the researcher and to the fact that there are different indices and units of measurement used for the various types of pollution in the different study areas. Air pollution is generally measured in terms of suspended particulates, but oxidants and sulphate pollution have also been used. Road traffic noise tends to be measured using the L_{eq} unit of measurement, whereas noise generated by aircraft is generally measured by reference to an index, such as the Noise and Number Index (NNI) in the UK, the Noise Exposure Forecast (NEF) used in conjunction with the Composite Noise Rating System (CNR) in the USA and Canada, and the Australian Noise Exposure Forecast (ANEF) is used in Australia.

When using the hedonic pricing method to estimate the effect of air or noise pollution on property values, a minimum level of air or noise pollution must be allowed for in the analysis as pollution levels below the minimum do not have a noticeable effect on human beings and therefore do not affect property values. Various measures have been used in the empirical studies, depending on what would legally be considered to be an acceptable normal level of air and noise pollution in the study area.

In empirical studies measuring the significance of proximity to transport infrastructure on property values, the target variable tends to be the location of the property relative to the transport infrastructure under consideration (measured in distance).

5.2.11 Length of Study Period

The majority of the hedonic pricing studies referred to in the course of this research used cross-sectional data (i.e. data relating to a large number of diverse properties at a point in time) for two separate study periods, one before and one after the development took place. This enabled the scale of

any anticipatory price shifts and the full capitalisation effect of the development to be assessed. The timing of the before and after study periods varied dramatically. In some studies, the before study period related to before the development proposal was announced, and in others, it related to the period directly before construction of the development began. With regard to the after study period, some studies assessed the short-term impacts of the completed development, whereas other studies addressed the impacts up to seven years after completion of the development.

Two of the hedonic pricing studies referred to included three study periods. Laakso (1992)[71] included a pre-development study period and two post-development study periods in his examination of the effects of the Helsinki Metro on property values. The first post-development study period examined the short-term impacts one year after the Metro became operational; and the second examined the effects seven years after completion of the development. Henneberry[72] (1998)[73] reported that the effect of the South Yorkshire Supertram on property values in Sheffield was assessed in 1988 (before a decision was taken to develop the tramway), in 1993 (when the development proposal had been announced but before construction had begun) and in 1996 (when the Supertram had been operational for one year).

Other hedonic pricing studies referred to assessed the influence on property values of proximity to a selected development or facility, such as a shopping centre (Des Rosiers et al 1996[74]) or urban amenities (Powe et al 1995[75]).

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71 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

72 Reference to research primarily undertaken by A. Antwi and others for a research programme funded by the Economic and Social Research Council, the Department of Transport and the South Yorkshire Passenger Transport Executive.

73 Henneberry, J. (1998), Transport Investment and House Prices, *Journal of Property Valuation and Investment*, Vol. 16, No. 2, 144-158.

74 Des Rosiers, F., Lagana, A., Thériault, M. & Beaudoin, M. (1996), Shopping Centres and House Values: An Empirical Investigation, *Journal of Property Valuation & Investment*, Vol. 14, No. 4, 41-62.

75 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147.

These studies had a different emphasis as they were assessing the impact of an existing development or facility as opposed to a proposed one. Therefore, only one study period was necessary. In the studies referred to, the study period ranged from one to two years.

5.2.12 Results of Hedonic Pricing Studies (Residential Property)

The overwhelming evidence of the empirical studies undertaken using the hedonic pricing method concludes that environmental pollution in the form of air pollution, noise nuisance and water quality deterioration and improvements in transport infrastructure have effected, to varying degrees, the residential property values upon which they impinge.

The results obtained from hedonic pricing studies which examined the impact of changes in environmental quality on property values have been broadly consistent across studies. The principle changes in environmental quality that were examined were sulphate and particulate air pollution and noise generated by road and air traffic. The various studies indicate that a one per cent increase in suspended particulates (air pollution) causes residential property prices to fall by between 0.01 per cent and 0.22 per cent[76]; and that a one unit increase in traffic noise (measured by L_{eq}) causes residential property prices to fall by between 0.08 per cent and 1.26 per cent[77]. Abelson (1996)[78] states that some of the variation in the results is probably attributable to differences in econometric practices, and the differences in local demand and supply conditions.

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[76] Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 31.

[77] Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 30.

[78] Abelson, P. (1996), *Project Appraisal and Valuation of the Environment*, Macmillan Press Ltd., London, p. 63.

Pennington (1990)[79] refers to research undertaken by Walters (1975), Pearce (1978) and Nelson (1978, 1980) who surveyed early hedonic pricing studies that estimated the effects of aircraft noise on property values. They concluded that the impact was generally small, but statistically significant, and that residential property values decreased by 0.5 per cent to 2.0 per cent for every one unit change in NEF. A study by O'Byrne et al (1985)[80] of Atlanta Airport found similar rates of depreciation, but noted that the earlier work tended to find larger effects. However, not all of the studies relating to the impact of aircraft noise on property values found the influence of noise to be statistically significant. The Li and Brown (1980)[81] study of Boston, and the Pennington et al (1990)[82] study of Manchester, showed that, when a variety of neighbourhood and environmental factors as well as noise pollution were added to an hedonic price equation, the differences which could be attributed to noise nuisance were statistically insignificant.

The hedonic pricing studies which examined the impact of transport infrastructure on residential property prices generally concluded that the impact was small - from no effect (Forrest et al, 1995[83]) to around 6% (Laakso, 1992[84]) and that the impact was limited to locations relatively close to the transport systems - within about 1,000 metres (Laakso, 1992[85]) or ten

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79 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

80 O'Byrne, P. H., Nelson, J. P. & Seneca, J. J. (1985), Housing Values, Census Estimates, Disequilibrium, and the Environmental Costs of Airport Noise: A Case Study of Atlanta, *Journal of Environmental Economics and Management*, Vol. 12, 169-178.

81 Li, M. M. & Brown, H. J. (1980), Micro-Neighbourhood Externalities and Hedonic Housing Prices, *Land Economics*, Vol. 56, 125-140.

82 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

83 Forrest, D., Glenn, J., Grime, K. & Ward, R. (1995), *House Price Changes in Greater Manchester 1990-1993 and the Impact of Metro Link*, Working Paper 16, Department of Geography, University of Salford, Salford, UK.

84 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

85 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

minutes walking time (So et al, 1997[86]). Some studies also identified negative externalities arising from pollution and congestion affecting the immediate vicinity of the transport infrastructure. These either reduced positive price effects (Laakso, 1992[87]) or, where such effects were negligible, acted to reduce house prices (Cervero, 1994[88]). Cervero (1994)[89] also found that the impact of rail-based transport systems on property prices was highly localised and that the type of rail technology, the extensiveness of the system and the character of the urban environment within which it was developed affected the system's impact.

In general, the hedonic pricing method has been applied to the evaluation of environmental costs rather than benefits. However, Garrod and Willis (1992)[90] examined the influence of the proximity of open water on property values in Gloucestershire, and found that, on average, it was responsible for a five per cent increase in residential property prices.

5.2.13 Results of Hedonic Pricing Studies (Commercial Property)

Very few hedonic pricing studies have been undertaken to examine the impact of some external factor or development on commercial property values. Damm et al (1980)[91] assessed the impact of the Washington Metro on retail property values by applying a practically identical hedonic equation to the one he had applied when assessing the impacts on residential property values. He found that proximity to the Metro impacted positively on retail

86 So. M., Tse, R. Y. C. & Ganesan, S. (1997), Estimating the Influence of Transport on House Price: Evidence from Hong Kong, *Journal of Property Valuation and Investment*, Vol. 15, No. 1, 40-47.

87 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

88 Cervero, R. (1994), *Development Impacts of Urban Transport: A US Perspective*, Paper Presented at ESRC Seminar on Transport and Urban Development, London, April.

89 Cervero, R. (1994), *Development Impacts of Urban Transport: A US Perspective*, Paper Presented at ESRC Seminar on Transport and Urban Development, London, April.

90 Garrod, G. D. & Willis, K. G. (1992), The Environmental Economic Impact of Woodland: A Two Stage Hedonic Price Model of the Amenity Value of Forestry in Britain, *Applied Economics*, 24, 715-728.

property values, and that increasing distance from the Metro station was associated with lower property values, and moreover, the effect of distance seemed to decline quite rapidly.

The most extensive hedonic pricing study undertaken with regard to commercial property values was by Antwi (1995)[92] who set a framework for adapting hedonic analysis to estimate the impact of the development of the South Yorkshire Supertram on commercial and industrial property values in Sheffield in the UK. However, the study failed to identify any discrete impact of the South Yorkshire Supertram on commercial and industrial property values. The study concluded that it is difficult to state whether this was as a result of analytical problems or due to the real market (non) response.

5.2.14 Accuracy of Hedonic Pricing Studies

The character and quality of the data used in the hedonic pricing studies referred to in the course of this research varies widely and the disparity in the results obtained can be partly attributed to this factor. Pearce and Markandya (1989)[93] state that the accuracy with which the empirical studies can quantify the effects of environmental pollution or significance of improvements in transport infrastructure is debatable. Markandya and Richardson (1992)[94] concur with this view and state that the use of the hedonic pricing method for benefit or cost estimation is not, and probably never will be, an exact science and that some inaccuracy is inherent in the task being attempted. However, using the hedonic pricing method to obtain an order of magnitude of the benefits or costs is worthwhile and the results are useful in reaching rational decisions with regard to investments involving such benefits or costs.

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91 Damm, D., Lerman, S. R., Lerner-Lam, E. & Young, J. (1980), Response of Urban Real Estate Values in Anticipation of the Washington Metro, *Journal of Transport Economics and Policy*, September, 315-336.

92 Antwi, A. (1995), *Estimating the Commercial Property Impacts of Urban Transport Investments Using Hedonic Analysis*, Paper presented at the Pacific Asia Property Research Conference, Singapore, April.

93 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris, p. 26.

5.2.15 Application to the EIA Process

Hyman (1981)[95] states that the hedonic pricing method is very useful in the environmental impact assessment process in terms of its overall applicability and usefulness in measuring the impact of changes in environmental quality or improvements in transport infrastructure on property values. However, the method has been little employed in the EIA process world-wide. This is largely due to the fact that the method is very data-intensive[96] and that a full hedonic pricing study cannot be done quickly and simply[97]. Therefore, it is not surprising to note that after extensive research, the author only identified two EIS's in which the hedonic pricing method had been applied to assess the impact of the proposed development on property values. Both of these EIS's related to large expansions of major international airports, which were likely to have significant effects on property values in the respective areas. The EIS's were for the Parallel Runway Project at Vancouver International Airport in Canada (1991) and the Third Runway at Sydney (Kingsford Smith) Airport in Australia (1991).

A similar approach was adopted in the application of the hedonic pricing method in both of the EIS's. In each case, a number of study areas were established in the respective cities to represent a base study case. Each study area included a variety of different house types, and a proportion of the properties within the study areas were already exposed to aircraft noise and the remainder were not. A hedonic pricing model was devised for each house type within each of the base study cases, with property price as the dependent variable, aircraft noise as the target variable and a number of

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94 Markandya, A. & Richardson, J. (eds) (1992), *Environmental Economics*, Earthscan Publications Ltd., London, p. 145.

95 Hyman, E. L. (1981), The Valuation of Extramarket Benefits and Costs in Environmental Impact Assessment, *Environmental Impact Assessment Review*, Vol. 2, No. 3, 227-258, p. 251.

96 Dixon, J. A., Fallon Scura, L., Carpenter, R. A. & Sherman, P. B. (eds) (1994), *Economic Analysis of Environmental Impacts* (2nd Edition),Earthscan Publications Ltd., London, p. 84.

97 Abelson, P. (1996), *Project Appraisal and Valuation of the Environment*, Macmillan Press Ltd., London, p. 65.

other independent variables representing the property, neighbourhood, locational and accessibility characteristics.

A multiple regression analysis was undertaken for each of the separate hedonic pricing equations for the different house types within the base study areas. The results indicated the impact on values for properties that were severely, moderately or mildly affected by aircraft noise. Using estimates of the increases in noise levels that were expected to be generated by the increased aircraft activity on specific flight paths, the property values in the affected areas were adjusted by the percentage results obtained from the hedonic pricing analysis.

5.3 'BEFORE AND AFTER' STUDY METHOD

5.3.1 Principle of the 'Before and After' Study Method

As the name suggests, a 'Before and After' study involves the examination of land and property value trends in an area both before and after the introduction of some external factor, such as a major development, into the area. The purpose of the study is to asses whether the development has impacted positively or negatively on land and property values in the study area, and to attempt to quantify the extent to which this has occurred. There are a number of variations of this method, which are dealt with in Section 5.3.3. The method can be quite successfully applied to the residential property market and to the development and agricultural land markets; however, it is not appropriate for application to the commercial property market due to the complexities associated with the valuation of such properties.

5.3.2 Methodology

In most 'before and after' studies, a 'control zone' is established so that land and property value trends in an area which is located outside of the sphere of influence of the development under consideration can be examined and used

as a comparative measure in the study. Data on all of the market transactions for land and property sales that took place within the control zone and the study area during the before and after study periods must be collected and collated.

The geographical area affected by the development is divided into impact zones. These are generally based on distance from the development under consideration, e.g. Zone 1 may be up to 500 metres from the development, Zone 2 may be 501 to 1000 metres, Zone 3 may be 1001 to 1500 metres, and so on. Rasbash (1983)[98] suggests that the impact zones could be based on areas which experience different environmental impacts. A range of environmental indices could be drawn up for the particular development, which would be based, in part, on local preferences and experiences and which would be used to weight the various environmental effects. Rasbash suggests that in the case of a road development, Zone 1 could represent severely affected areas with noise levels in excess of 75 dB(A) and with significant visual intrusion; whereas Zone 6 could represent normal suburban conditions of 55 dB(A) with no visual intrusion from the road development.

The land and properties within the study area are assigned to a particular impact zone depending on their location. They are then segregated into classes of development, such as development land, agricultural land, and detached houses, semi-detached houses, bungalows, apartments, etc. within the residential market. The residential properties are further classified by reference to the number of bedrooms, e.g. three bedroom detached houses, four bedroom detached houses, five bedroom detached houses, three bedroom semi-detached houses, four bedroom semi-detached houses, etc.

Within each impact zone, the values of the land and properties are examined within the before and after study periods, and property value trends for each classification of land and property type are established. These land and

[98] Rasbash, D. L. (1983), The Use of Changes in Property Values in the Evaluation of Highway Schemes, *The Journal of the Institution of Highways and Transportation*, August/ September, 22-25.

property value trends are then compared with the trends for the same classification of land and property within the 'control zone'. From this comparison, any impact of the development on land and property values in the various impact zones should be readily identifiable and quantifiable.

5.3.3 Variations of the 'Before and After' Study Method

The various approaches to the 'before and after' study method which have been applied in the USA and Canada are as follows:

- Some studies do not incorporate a 'control zone' for comparative purposes, and the impact of the development on land and property values is established by analysing the trends for each type of land and property classification within the individual impact zones, and comparing any increases or decreases with movements in the general rate of inflation or in average property price increases or decreases. However, without a 'control zone' the results obtained from the study may be biased, as there may have been other developments in the area that may have contributed to some of the increases or decreases in land and property values within the study area which have not been allowed for.
- A number of studies use one continuous study period as opposed to two separate before and after study periods. In such instances, the study period would begin prior to the announcement of the development proposal and would finish once a sufficient time period in which to establish any post-development property value trends had elapsed.

5.3.4 Application of the 'Before and After' Study Method

This approach has been successfully applied in the EIA systems of a number of Canadian provinces and American states. The approach has been primarily applied in cases where an expansion of an existing development is proposed. While the results obtained from such studies may be slightly subjective, they provide a reasonable indication of the quantitative impact of the development

on property values in the area. For further endorsement, they may be compared to the results obtained from other similar studies.

5.4 BENEFITS/ COSTS TRANSFER METHOD

5.4.1 Principle of the Benefits/ Costs Transfer Method

Benefits/ Costs Transfer refers to the process by which a demand function or value, estimated for one environmental attribute or group of attributes at a site, is applied to assess the benefits/ costs attributable to a similar attribute or site[99]. Using this method, the potential impact of a proposed development on property values could be quantified by reference to the results of published studies which quantified in percentage terms how similar type developments impacted on property values in other areas.

5.4.2 Methodology

Property value trends in the study area are established based on interviews with local estate agents and available sales information. Then the land use and topographical characteristics of the area surrounding the location of the proposed development are identified and the potential impacts of the proposed development are reviewed. The details of the study case are then compared with those of other relevant studies, and the potential impact of the proposed development on property values in the locality is quantified by reference to the findings of previous studies undertaken.

The use of the benefits/ costs transfer method is usually advocated on the grounds of resource constraints. However, Garrod and Willis (1999)[100] urge that caution should be exercised in the use of this method so as to ensure

[99] Garrod, G. & Willis, K. G. (1999), *Economic Valuation of the Environment – Methods and Case Studies*, Edward Elgar Publishing Limited, UK, p. 331.

[100] Garrod, G. & Willis, K. G. (1999), *Economic Valuation of the Environment – Methods and Case Studies*, Edward Elgar Publishing Limited, UK, p. 331.

that the benefits/ costs estimated in other studies are not inappropriately transferred.

5.5 CONCLUSION

This chapter examined three quantitative approaches that have been developed to assess the impact of external factors or developments on property values. The approaches were the Hedonic Pricing Method, the 'Before and After' Study Method and the Benefits/ Costs Transfer Method. The Hedonic Pricing Method is the only one of the methods that is based on a mathematical model, and as such, the results of hedonic pricing studies are considered more credible and objective, than those obtained by the other two methods.

Of the three methods, the Hedonic Pricing Method is the most extensively applied method in property value studies. However, the method has only been employed in a nominal number of EIA's. Following extensive research, the author only identified two EIA's in which the hedonic pricing method had been applied to assess the impact of the proposed development on property values. These EIA's referred to significant airport expansion projects in Vancouver, Canada and in Sydney, Australia.

Chapter Six explores the suitability of the three quantitative approaches detailed in this chapter for application in the Irish EIA process.

CHAPTER SIX

Practical Application of Quantitative Approaches to Property Value Assessment in the Irish EIA Process

CHAPTER SIX

PRACTICAL APPLICATION OF QUANTITATIVE APPROACHES TO PROPERTY VALUE ASSESSMENT IN THE IRISH EIA PROCESS

6.1 INTRODUCTION

This chapter examines the issue of whether it is possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process. In this regard, the practical application of three quantitative approaches, namely the Hedonic Pricing Method, the 'Before and After' Study Method and the Benefits/ Costs Transfer Method, are explored, through the use of case studies, for application to the Irish EIA process.

6.2 THE HEDONIC PRICING METHOD

6.2.1 Context

Antwi (1993)[1] regards the hedonic pricing method as the most appropriate method for assessing the impact of a major development on property values. As no hedonic pricing studies have been undertaken in the Republic of Ireland to date, the author proposed to test the suitability of the method for application in the Irish EIA process.

Hyman (1981)[2] states that the hedonic pricing method is very useful in the EIA process in terms of its overall applicability and usefulness in measuring the impact of changes in environmental quality or improvements in transport infrastructure on property values. However, the method has been little

[1] Antwi, A. (1993), *The Impact of New Transport Infrastructure on Land Use and Property Values - Analysis of Theory and Evidence*, Urban Transport Studies, Paper No. 6, School of Urban and Regional Studies, Sheffield Hallam University, Sheffield, UK.

[2] Hyman, E. L. (1981), The Valuation of Extramarket Benefits and Costs in Environmental Impact Assessment, *Environmental Impact Assessment Review*, Vol. 2, No. 3, 227-258, p. 251.

employed in the EIA process world-wide. The author attributes this to two factors. Firstly, most of the hedonic pricing studies that have been undertaken have measured the impact of an external factor or development on property values retrospectively. This factor obviously limits the potential of the method for application in the EIA process where one is dealing with development proposals as opposed to completed developments. The two EIS's that the author identified that had applied the hedonic pricing method both related to the expansion of existing developments (expansions of major international airports). In both instances, the impact of aircraft noise on the value of properties located under the existing flight paths was measured using the hedonic pricing method and the results were used to predict the potential impact of the proposed airport expansion on property values. Secondly, the limited application of the hedonic pricing method may be attributed to the fact that it is very data-intensive[3]. Due to the monetary and time resources necessary to collect, collate and analyse the extensive amount of data required to undertake a hedonic pricing study, it is probable that this method is only considered in the case of major developments, where the effects on surrounding property values are likely to be very significant.

Despite the limitations of the hedonic pricing method for application in the EIA process, as outlined above, the author proposed to undertake two case studies on major developments that had significantly affected property values in their respective localities, in order to test the suitability of the method for application in an Irish context. It was hoped that if hedonic pricing studies could be undertaken successfully in Ireland, that the results of such studies (and subsequent ones) may also be capable of being applied in the EIA process through the use of the Benefits/ Costs Transfer Method.

Due to the fact that it is very difficult to allow for rapidly rising property prices in the statistical analysis, it is preferable to undertake a hedonic pricing study

[3] Dixon, J. A., Fallon Scura, L., Carpenter, R. A. & Sherman, P. B. (eds) (1994), *Economic Analysis of Environmental Impacts* (2nd Edition),Earthscan Publications Ltd., London, p. 84.

during periods of relative stability in the property market. Therefore, it would have proved very difficult to have undertaken a hedonic pricing analysis in Ireland since 1995, as house price inflation (adjusted for the Consumer Price Index) was as high as 77% over the period 1995 to 2000[4]. The case studies for the hedonic pricing method were undertaken during the period 1993/ 1994. The two case studies are detailed in the following sections.

6.2.2 Selection of the Case Studies

6.2.2.1 Criteria for the Selection of the Case Studies

The author considered it necessary to undertake two distinctly different case studies in order to test both the applicability and the universality of the hedonic pricing method in an Irish context. Therefore, it was proposed that one of the case studies would be a private sector development that had taken place in a provincial town, and the other would be a public sector development that had taken place in a large urban area.

In order to select two suitable developments, the following criteria were established:

- It was desirable that the selected development had been completed between 1985 and 1990. This was to ensure that a sufficient time period had elapsed since completion of the development, so that the short and medium-term effects on property values in the area could be established.
- It was preferable that the proposal for the selected development had been announced since 1980. This was to facilitate collection of the data required in order to establish a base-line study for the period prior to the announcement of the development.
- It was imperative that no other significant developments had taken place in the surrounding area either at the time that the selected development was constructed, or since, and that the property market had been relatively stable during the study period. This was to ensure that a

[4] *BIS Quarterly Review* (August 2000), Bank of International Settlements.

significant proportion of the fluctuations in property values in the area could reasonably be attributed to the selected development.

- If proposed now, the selected development would have to be one of the project types listed in Part I or Part II of Schedule 5 of the Planning & Development Regulations 2001 which require an EIA.

6.2.2.2 Selection Process

After much deliberation, two case studies were selected, namely:

- The Fruit of the Loom development in Buncrana, Co. Donegal; and
- The Navan Road Improvement Scheme to include the stretch of road between the Dublin City/ County boundary and the Dublin/ Meath County boundary.

The Fruit of the Loom development in Buncrana, Co. Donegal, was an obvious choice for the private sector case study. At the time that the study was undertaken, Fruit of the Loom was the largest private sector manufacturing employer in the Republic of Ireland and Buncrana was a town with a population of only 4,000 people which was located in a relatively peripheral location in North County Donegal. A joint venture between W. P. McCarter & Co. Ltd. and the American based 'Fruit of the Loom' firm in 1987, resulted in a dramatic increase in employment from 400 in 1987[5] to c. 1,600 in 1994[6] at the Buncrana plant. Accordingly, the creation of 1,200 new jobs in Buncrana over a relatively short period of time had a very dramatic impact on the town, particularly on land and property values. This case study attempted to use the hedonic pricing method to quantify the impact that increased disposable income in Buncrana town, due to Fruit of the Loom locating there, had on residential and commercial property values and on development land values in the area.

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5 Buncrana Urban District Council, Buncrana Urban District Draft Development Plan 1992.

6 Difficulties were encountered in attempting to obtain exact figures for the number of people employed in the Fruit of the Loom plants in Buncrana town.

A number of developments were considered for the second case study, a public sector development in an urban area. These included the DART system, the Naas By-Pass, the Athlone By-Pass, and the Clonee By-Pass; with the obvious choice being a study of the impact that the DART had on property values in the neighbourhoods it passes through. However, a major problem associated with using transport infrastructure projects such as the DART or major road developments as case studies, is that the time period between when they are announced as a proposal and incorporated in the relevant development plan for the area and when construction actually begins can often be in excess of ten years. This presents considerable problems with data collection as a base-line study has to be established for the period prior to the announcement of the proposed development, which in some of the above cases, would have extended to over twenty years prior to the case study being undertaken.

The Navan Road[7] Improvement Scheme was eventually chosen as the second case study. In the late 1980's and the early 1990's, the Navan Road was the subject of a major road improvement scheme which was part of an overall programme of extensive road development in County Dublin. The main impetus of this programme was the development of a motorway around the outskirts of the City, which was to comprise of the Northern and Southern Cross motorways and the Western Parkway motorway. These plans included a proposal for a major roundabout along the Navan Road at the point where the M50 Western Parkway motorway heading northwards ended and the Northern Cross motorway[8] began. Therefore, it was necessary to upgrade the Navan Road in order to ensure that it had the capacity to deal with the increased volumes of traffic that would be generated by vehicles entering

[7] The Navan Road is the main arterial road which links Dublin City with the N3, the National Primary road which heads north-westwards out of Dublin in the direction of Navan, Kells and Cavan. The Navan Road runs from the junction of the Cabra Road and the Old Cabra Road in the City to the Clonee By-Pass at the Dublin/ Meath County boundary. The road passes through the primarily residential areas of Ashtown, Castleknock, Blanchardstown and Mulhuddart in north-west Dublin.

[8] The Northern Cross motorway was still only a proposal when this case study was undertaken.

onto or exiting off the motorway at this point. Another significant reason that contributed to the Navan Road improvements was that there was a proposal to develop a major town centre west of Blanchardstown village, but due to the volumes of traffic that such a development would generate, Dublin County Council stated that the Navan Road had to be upgraded and the Blanchardstown By-Pass built before they would consider such a proposal. Both of the above reasons necessitated the improvement of the Navan Road, and accordingly, it was widened to four lanes (two lanes in either direction) and a number of major roundabouts and interchanges were built along the route.

It was hoped that this would be a very interesting case study due to the fact that the Navan Road Improvement (which included the construction of the Blanchardstown By-Pass) was inextricably linked to the construction of the M50 Western Parkway motorway, which connected to the Navan Road east of Blanchardstown village. The case study provided the possibility to study the impact of major road development and improvement works on property values both in established suburban areas and in previously undeveloped areas such as along the M50 and the Blanchardstown By-Pass. Another interesting aspect of the case study, which it was hoped would be reflected in the results, is that the Navan Road passes through various established residential neighbourhoods which have distinctly different socio-economic profiles, such as Castleknock and Corduff. Detailed proposals for the Navan Road Improvement Scheme were first shown on the 1981 Draft Development Plan for Dublin County and construction was undertaken during 1991 and 1992. This case study was undertaken in 1994. Although, the time-frame involved would only allow the short-term effects of the road improvement on property values to be considered, it was hoped that it would prove to be a very worth-while study. This case study attempted to use the hedonic pricing method to quantify the impact that the Navan Road Improvement Scheme had on residential and commercial property values and on development land values in the area.

6.2.3 Primary Data Required for the Case Studies

6.2.3.1 Property Price Details

Market Transaction Prices v's Advertised Asking Prices

As referred to in Section 5.2.6, previous hedonic pricing studies have overwhelmingly used market transaction prices as opposed to advertised asking prices or professional valuations. This is due to the fact that actual market prices are considered to be the most objective indicator of value as they are the outcome of the interplay of economic forces of demand and supply, as determined by buyers and sellers in the property market. Advertised asking prices or professional valuations tend to be used in cases where data on actual market transactions are not readily available.

As the literature advocates the use of market transaction prices, the author proposed to collect data on transaction prices as opposed to asking prices for residential and commercial properties within the relevant study areas for the case studies. With a few exceptions, privately owned houses and apartments in the Republic of Ireland can be bought and sold without restrictions, and the market prices are set by supply and demand; therefore, the selling prices represent the market value of residential property in Ireland quite accurately. This choice was further strengthened by the fact that in Ireland there is no readily available data on either asking prices or professional valuations which could be used as an alternative.

Source of Transaction Prices

As data on property transaction prices are not readily available in the Republic of Ireland, a number of options for data collection were considered. Firstly, a number of the national building societies were contacted and requested to provide comprehensive details on mortgage acceptances in the relevant study areas. Due to the confidential nature of the data, a large number of them were reluctant to provide such data. This option was disregarded as the author felt that even if one or two of the building societies operating in the

relevant study areas provided details on mortgage acceptances, that the size of the data sample would be insufficient to carry out a meaningful analysis.

Secondly, the Revenue Commissioners were contacted and requested to provide data on stamp duty payments on property sales in the relevant study areas. This request was refused for confidentiality reasons.

The final option available to the author was to examine back issues of newspapers that had circulated in the relevant study areas during the study periods under consideration and to extract details on all the properties for sale by private treaty or auction in that area. Once this task was completed, it was proposed to contact the auctioneers who had advertised the properties and to request them to provide details on transaction prices and the transaction dates. In the Republic of Ireland, newspaper advertisements generally provide details on the type of property, address, size, accommodation, special features of the property, etc. Sometimes asking prices are stated in newspaper advertisements; although outside of the main cities this practice is not very prevalent. It was proposed that any further details that were required necessary for the hedonic pricing analysis that were not included in the newspaper advertisements would be requested from the auctioneer who handled the sale. Despite the momentous nature of this task and the considerable amount of time required to survey back issues of the relevant newspapers in the National Library[9] and to contact all of the auctioneers who had advertised properties for sale in the study areas, the author felt that this was the only option available for data collection of details on property transaction prices.

6.2.3.2 Property Characteristics

It was proposed to extract details on the property characteristics (area, number of bedrooms, plot size, presence of a garage, etc.) from the

[9] The National Library holds back issues of the newspapers printed in the Republic of Ireland.

newspaper advertisements, and to supplement these with additional details to be provided by the estate agent who had advertised the property.

One property-describing characteristic which the author proposes to omit is condition, as the information provided with regard to condition in newspaper advertisements is considered subjective. Also, Dodgson and Topham (1990)[10] carried out an experiment in which a sample of properties were valued by reference to a hedonic price equation and by means of on-site surveyors' inspections. Valuations from the two methods were broadly similar, suggesting that house condition (obtainable only by the surveyors) was typically not of descriptive importance in the determination of house prices.

6.2.3.3 Neighbourhood Variables

In the Republic of Ireland, there is no code system available to represent neighbourhood characteristics which would be similar to the ACORN code system or the Parliamentary Constituency Class system that were used in a number of UK studies (refer to Section 5.2.8). Therefore, the author proposed to use ward level data from Census' or Small Area Population Statistics, where available, to represent neighbourhood characteristics.

6.2.3.4 Locational and Accessibility Variables

The author proposed to use the address of the property to identify its location on an Ordnance Survey Map and then, to measure the distance of each property from key locations and facilities relevant to the case study. Distance of the properties from such key localities and facilities were to be measured as the crow flies and were to be expressed within pre-determined ranges such as, less than 100 metres, 100 to 400 metres, 400 to 800 metres, etc.

[10] Dodgson, J. & Topham, N. (1990), Valuing Residential Properties with the Hedonic Method: A Comparison with the Results of Professional Valuations, *Housing Studies*, June.

6.2.4 Approach to the Case Studies

6.2.4.1 Fruit of the Loom, Buncrana, Co. Donegal

This case study attempted to use the hedonic pricing method to quantify the impact that increased disposable income in Buncrana town, due to Fruit of the Loom locating there, had on residential and commercial property values and on development land values in the area. A secondary objective of the analysis was to identify the sphere of influence of the negative externalities experienced by the residents living in close proximity to the Shore Road and the Ballymacarry Lower plants and to quantify what impact they had on

Figure 6.1: Photograph showing the location of the Fruit of the Loom Shore Road and Ballymacarry Lower Plants in Buncrana

property values in these areas. The negative externalities included increased pedestrian and vehicular traffic and the resulting increases in noise and pollution, noise from the tannoy system, air emissions, noxious smells, etc.

Due to the small number of properties that were available for sale or for letting in Buncrana (e.g. 77 newspaper advertisements were placed for the sale or letting of land or property in Buncrana in 1988[11]), the author decided that the only feasible option was to just collect data on second-hand residential properties that had been offered for sale. Due to the sample sizes, this had to be done on a time series basis (uses a small number of similar properties over a period of years) as opposed to on a cross-section basis (uses a larger number of diverse properties at a point in time). However, this approach necessitated the inclusion of variables for external influences such as interest rates, inflation and mortgage rates in the hedonic pricing equations.

The proposed study period was a ten year period from the 1st of January 1984 to the 31st of December 1993. This incorporated a four year period prior to expansion in 1988 in order to establish trends in the residential property market and a five year period after 1988 in order to establish what impact Fruit of the Loom locating in Buncrana town had on residential property values both in the short and the medium term. The proposed study area was the area covered by Buncrana Town and its Environs, as defined for Census purposes[12].

It was proposed to develop separate hedonic pricing equations for each of the various types of second-hand residential properties. These included detached houses, semi-detached houses, terraced townhouses, bungalows in multiple

[11] Author's own research – Refer to Table A.1 in Appendix No. 3.

[12] The Environs are under the jurisdiction of Donegal County Council. They are defined for Census purposes to include that part of Luddan bounded by the Barrack Road and the shore south of the entrance to the North Western Golf Club. To the north, it includes that area out to the Cockhill Bridge and along the Dunree Road to the Council Housing Scheme.

developments, dwellings on 0.2 hectare[13] or larger sites, and apartments. In each hedonic pricing equation, the dependent variable was property price and the independent variables were property characteristics, neighbourhood variables, locational and accessibility variables, environmental variables, rate of new residential development and finally, external influences, such as interest rates, inflation and mortgage rates. The target variable, or the variable under investigation, was the increase in disposable income. It was then proposed to analyse each of the separate hedonic pricing equations developed for the various types of second-hand residential properties for each of the study years 1984 to 1993.

6.2.4.2 Navan Road Improvement Scheme

This case study attempted to use the hedonic pricing method to quantify the impact that the Navan Road Improvement Scheme had on residential and commercial property values and on development land values in the area. It was expected that property values in the study area would have been positively influenced by the improved accessibility to the city centre and to Blanchardstown and the Western Parkway (M50) motorway which was created by the road improvement. However, some properties located in close proximity to the road would have experienced negative externalities, such as increased traffic, noise, fumes, disturbance, etc. which may have had a negative influence on their values.

It was proposed to undertake a before and after study to determine the effects that the Navan Road Improvement Scheme had on commercial and residential property values in the area. It was considered necessary to study a period prior to the road proposals being included in the relevant Development Plan for the area in order to establish a base-line study (1980 was the selected year); a period prior to the road improvements being undertaken (1987 was the selected year); and a period after the road improvements had been completed (1993 was the selected year).

[13] 0.2 hectares equates to approximately 0.5 of an acre.

Figure 6.2: Map illustrating the Study Area for the Navan Road Improvement Scheme Case Study

The stretch of the Navan Road which is the subject of this study is of 4.8 kilometres (3 miles) in length and runs from the Dublin City/ County Boundary at the Ashtown Roundabout to the Dublin County/ Meath County boundary where the Navan Road meets the Clonee By-Pass. The study area is effectively a corridor along the length of this stretch of road which extends to 0.8 kilometres (0.5 miles) on either side of the road, as illustrated on Figure No. 6.2 on Page 114. The study area includes parts of Castleknock, Blanchardstown Village, Clonsilla, Abbotstown, Corduff, Blakestown, Mulhuddart, Huntstown, Lady's Well, Tyrrelstown, Tolka and Castaheany. The dominant land use in these areas is residential with some commercial land use concentrated around Blanchardstown village.

It was proposed to carry out a separate hedonic pricing study for the residential and the commercial properties. The study on commercial property was dependant on amassing adequate sample sizes for retail, office and industrial properties from the letting transactions which took place within each study year, and on obtaining sufficient relevant details on each transaction. Depending on the information obtained, it was hoped that separate hedonic pricing equations could be developed for the retail, office and industrial properties for each of the study years. In each of the hedonic pricing equations, it was likely that the dependant variable would be rental value; the independent variables would be the property characteristics and the locational and accessibility variables; and the variable under investigation would be improved accessibility which would be represented by travel time savings.

For each study year, it was proposed to develop separate hedonic pricing equations for the various types of residential properties such as, semi-detached houses, detached houses, terraced houses, apartments and bungalows. For each of the hedonic pricing equations, the dependant variable would be property price; the independent variables would be the property characteristics, neighbourhood variables, locational and accessibility variables, and the rate of new residential development; and the variable under investigation would be environmental quality. As there can be only one

variable under investigation in each hedonic pricing equation, it was hoped that improved accessibility would be reflected in the locational and accessibility variables.

Please refer to Appendix No. 3 for a detailed account of both case studies.

6.2.5 Findings of the Case Studies

Both of the case studies had to be abandoned at the data collection stage due to the inaccessibility of pertinent data. Requisite data for both of the case studies was either unavailable or non-existent, and the data that was available in some instances, was not detailed enough for inclusion in the statistical analysis. This was particularly so with regard to data on property market transactions and measures of environmental variables in both of the case studies.

The primary data deficiencies were as follows:

- Data on Property Market Transactions - As detailed in Section 6.2.3.1, data on property transactions is not readily accessible in Ireland. In an attempt to obtain such data, the author examined back issues of the newspapers that had circulated in the study areas and extracted details on land and property that had been advertised for sale or letting during the selected study periods. The author then contacted the estate agents who had advertised the land and property for sale or letting, in order to obtain further details on the land and property and the transaction details. However, most of the estate agents were reluctant to partake in such an exercise. The primary reasons quoted were client confidentially and the time required to access such information[14].
- Measures of Environmental Variables – There was a veritable dearth of data on environmental variables. In the case of the Fruit of the Loom case study, no data whatsoever was available due to the fact that no

[14] At the time the case studies were undertaken, very few estate agents in Ireland kept computerised records.

independent environmental tests had been commissioned by Buncrana Urban District Council during the study period of 1984 to 1993. In the case of the Navan Road Improvement Scheme, the Environmental Health Department of Fingal County Council only carried out tests to determine noise levels or air quality in response to the lodgement of complaints. As a result, only eight tests regarding noise levels had been undertaken and no tests to measure air quality had been undertaken during the study years.

- Census Data for Neighbourhood Characteristics – Ward level Census data was available for the Navan Road Improvement Scheme case study. However, in the case of the Fruit of the Loom case study, the Small Area Population Statistics that were available for the Buncrana area related to the whole town plus its environs, and as such, it was not possible to use Census data to represent neighbourhood characteristics in this case study.
- Measure of the Increase in Disposable Income for the Fruit of the Loom case study[15]. In this regard, Mr. Terry Kelly, the Personnel Manager of Fruit of the Loom, initially agreed to assist the author with her study. However, as the case study progressed, Mr. Kelly became increasingly reluctant to provide the requisite data. The approach taken by the author to collect the required data by alternative means is documented in Appendix No. 3.

A further finding from the Fruit of the Loom case study, was that the hedonic pricing method is not suitable for application to relatively small towns. Even if the data on property transactions was available, the total number of property transactions that took place in any one year was insufficient to yield enough data to undertake the statistical analysis, on either a cross-sectional or time series basis. This was without even further sub-dividing it into all the various

[15] It must be borne in mind that data collection took pace simultaneously and that Fruit of the Loom had initially agreed to participate in this study. It only became evident after a lot of time and research had been invested in this case study, that Fruit of the Loom were unwilling to provide the relevant information with regard to the workforce of the Buncrana plants, which they had initially agreed to provide.

types of residential properties, commercial properties, agricultural land, development land, etc. This issue is explored further in Section 6.2.6.

6.2.6 Limited Potential of the Hedonic Pricing Method due to the Sample Size Required

It was evident from the Fruit of the Loom case study, that the hedonic pricing method is only suitable for application to large urban areas or cities, where a sufficiently large sample of property transactions for similar type properties within each of the neighbourhoods within the study area may be amassed. To put it in context, So et al (1997)[16] investigated the influence of transport on 1,234 residential properties in Hong Kong; Pennington et al (1990)[17] analysed sales data for 3,472 residential properties in their study of the link between property values and the noise nuisance generated by Manchester International Airport; and Laakso (1992)[18] investigated the effect of proximity to the Helsinki Metro on 6,700 residential properties. Therefore, due to the sheer volume of property market transactions that need to have taken place in the study area within the relevant study period, it is probable that even if the relevant information was available in the Republic of Ireland, that it would only be possible to use the method in the case of major developments that have taken place within large urban areas.

In order to put the sample sizes of residential property transactions used by Sol, Pennington and Laakso in their studies into perspective, the author attempted to estimate how many residential property transactions would take place in a year in a city with a population of say, 50,000 persons. Based on

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16 So, H. M., Tse, R. Y. C. & Ganesan, S. (1997), Estimating the Influence of Transport on House Price: Evidence from Hong Kong, *Journal of Property Valuation and Investment*, Vol. 15, No. 1, 40-47.

17 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59.

18 Laakso, S. (1992), Public Transport Investment and Residential Property Values in Helsinki, *Scandinavian Housing & Planning Research*, Vol. 9, 217-229.

the National average figure of 3.14 persons per household[19], it is reasonable to assume that there are c. 16,000 permanent households within such a city, with public housing representing a percentage of this figure. Within Ireland, there are no published statistics available on the percentage of residential properties that are sold in any one year per thousand households. Obviously, the number of residential property transactions will vary from one locality to another and the number of transactions will also be affected by the state of the housing market. However, at any one time, only a small percentage of the residential properties in an area will be available on the market for sale. Chadwick (1995)[20] states that in the UK, a figure that is often quoted is that three to four per cent of the owner-occupied housing stock is on the market at any one time. No comparative figures are available for Ireland, but given the propensity of Irish people, particularly those living outside of the large urban areas, to purchase a house and to live in it for most of their lives, it is probable that the comparative Irish figure would be lower than three to four per cent. Using the three to four per cent figure quoted by Chadwick, and optimistically assuming that residential properties would sell within four months of coming on the market, an optimistic estimate for the annual percentage of residential properties that may be sold is nine to twelve per cent of the owner-occupied housing stock. Based on this assumption, up to 6,000 residential property sales may take place in any one year in a city with a population of c. 50,000 persons. However, it is unlikely that a proposed development would significantly impact on residential property values in all areas of the city, and therefore, the sample size of residential property transactions would be further reduced.

In an attempt to further emphasise the fact that the hedonic pricing method has limited potential for application in an Irish context due to the sample size required, the 762 EIS's submitted to 'competent authorities' in Ireland

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19 Central Statistics Office, (1997), *Census 96 - Volume 3 Household Composition and Family Units*, Stationary Office, Dublin.

20 Chadwick, A. (1995), Socio-Economic Impacts 2: Social Impacts, in P. Morris & R. Therivel (eds), *Methods of Environmental Impact Assessment*, UCL Press, London.

between 1988 and 1997[21] were reviewed and the locations of the proposed developments were categorised using the population size[22] of the proposed location. Details are provided in Table 6.1. The results reveal that only 22.4% of the EIS's submitted were for developments proposals for areas that had a population in excess of 50,000 persons.

Table 6.1: Categorisation by Population Size of the Locations of the Proposed Developments for which EIS's were Submitted 1988-1997

Population Size Category	No. of Proposed Developments	% of Total Number of Proposed Developments
< 500	249	32.7%
501 - 1,000	71	9.3%
1,001 - 2,000	65	8.5%
2,001 - 5,000	67	8.8%
5,001 - 10,000	48	6.3%
10,001 - 20,000	65	8.5%
20,001 - 50,000	27	3.5%
50,001 - 100,000	21	2.8%
100,001 - 500,000	16	2.1%
500,001 +	133	17.5%
TOTAL	**762**	**100%**

Source: Author's Own Research.

6.2.7 The Hedonic Pricing Method: Overall Findings

As is evident from the fact that both of the case studies had to be abandoned at the data collection stage, data deficiencies render the hedonic pricing method inoperable in Ireland at the present time. Pertinent data for both of the case studies was either inaccessible or non-existent, and the data that was

[21] Author's own research.

[22] Central Statistics Office (1997), *Census 96 - Volume 1 Population Classified by Area*, Stationary Office, Dublin.

available in some instances, was not detailed enough for inclusion in the statistical analysis. This was particularly so with regard to data on property market transactions and measures of environmental variables in both of the case studies. The inaccessibility of data on property sales or lettings was exacerbated by the lack of a central register or database of property transaction details, similar to those available in North America, and in some European countries such as Scotland[23], The Netherlands and Sweden.

As a result of the extensive difficulties encountered, the suitability of the hedonic pricing method could not be tested for application in an Irish context. However, it must be borne in mind, that the application of the method in the EIA process would not take the form of a before and after study as was attempted in each of these two case studies. As was detailed in Section 5.2.15, the process would involve establishing a base study case, comprising a number of study areas, some of which are already exposed to the external factor under consideration and some which are not. In establishing a base study case, relatively recent data would be used, and therefore, the difficulties that the author encountered in the retrieval of historic data would not be experienced to the same extent. However, difficulties in amassing details on property market transactions would still be experienced due to the lack of a central register or database.

Finally, as was evident from the Fruit of the Loom case study, the hedonic pricing method is only suitable for application to large urban areas. In this regard, an alternative quantitative approach that may have greater universal application in an Irish context needed to be considered and tested. Hence, the suitability of the 'Before and After' Study method and the Benefits/ Costs

[23] Scotland has a national, public access system for the registration of legal documents. Data on house sales are kept in fifteen Registers and a computerised version of the transactions is compiled by the Land Value Information Unit at the University of Paisley. The computerised record of each property transaction contains details on the address of the property, the sale price and a code which provides information on the nature of the sale.

Transfer method for application in the Irish EIA process is explored in Sections 6.3 and 6.4.

6.3 THE 'BEFORE AND AFTER' STUDY METHOD

6.3.1 Application of the Method

The 'before and after' study method has been applied in the USA and Canada for quantifying the impact of developments on property values. In particular, it has been applied in the case of developments that are perceived as being undesirable, such as landfill sites, quarries, rotary kilns, etc. Its application to the EIA process is limited to the degree that when undertaking an EIA the development is only a proposal and therefore, one cannot measure the 'after' impact of that particular development on property values. However, the method has been applied in the EIA process in cases where there is a proposal to expand an existing development. In such instances, the method has been applied to quantify the impact that the existing development has had on property values in the area since its development, and reference is made to the findings in the EIA undertaken for the proposed expansion of the development.

If a number of 'before and after' studies were successfully carried out for various types of developments in Ireland, and if the results of the studies for each particular type of development were broadly similar, it is reasonable to assume that the results of these studies could be broadly applied to quantify the potential impact of proposals for similar type developments on property values in alternate locations. In order to test the suitability of the 'Before and After' Study method for application in an Irish context, the author attempted to undertake two 'before and after' studies to assess the impact of two landfill sites on residential property values in their surrounding localities.

6.3.2 Case Studies on the Impact of Landfill Sites on Residential Property Values

Generally, the announcement of a development proposal for a landfill site in Ireland causes considerable consternation among residents in the proposed locality. In this regard, concerns are usually expressed about possible health issues and the devaluation of land and property. The overall conclusion drawn from American and Canadian studies is that landfill sites do not seem to have a significant negative effect on residential property values. The results of the studies vary, with residential property devaluation of between zero and ten per cent for properties located within 500 metres of the landfill site[24] being reported. However, the majority of studies have found that any effects experienced are temporary and that property values tend to return to normal after three to five years. A key consideration is that the landfill site is well managed and the noise, odour and visual impacts are properly mitigated. It is interesting to note that the studies generally found that residential properties located further than 500 metres away from the landfill site tended not to experience any decline in value.

Using the 'Before and After' Study method, two Irish case studies were undertaken in 1998 to examine how landfill sites impact on the value of residential properties located in close proximity to them, and to ascertain whether the findings from the two studies were broadly similar. The following case studies were selected:

- A landfill site, which began operation in 1991, located at Ballydonagh, seven kilometres east of Athlone town adjacent to the N6, the National Primary route between Dublin and Galway.
- A landfill site, which began operation in 1989, located at Donohill, Co. Tipperary, seven kilometres north-east of Tipperary town adjacent to the R497 Road.

[24] Information supplied by Mr. Derek Doyle, Director of Environmental Assessment, Ministry of Environment and Energy, Ontario, Canada.

The author proposed to apply the methodology for the 'Before and After' Study method as detailed in Section 5.3.2. In both case studies, the pre-development study period relates to a period before the proposal regarding the siting of the landfill operation was announced. The pre-development study period for the Ballydonagh case study was 1987, and the corresponding period for the Donohill case study was 1985. The post-development study period was 1997/1998 in both cases.

A major shortcoming of the 'before and after' study method is that it does not specifically allow for the neighbourhood and locational and accessibility characteristics of the residential properties within the study area. In most 'before and after' studies the only locational characteristic of the property that is controlled for is the distance from the development in question. However, both the Li and Brown (1980)[25] and the Pennington et al (1990)[26] hedonic pricing studies concluded that neighbourhood characteristics, in particular, were very significant in the determination of residential property prices. Therefore, if possible, the author proposed to further sub-divide the impact zones into sectors depending on the 'neighbourhood' characteristics of the area and/ or distance from the town centre or other key facilities. Obviously, a pre-requisite to doing this is to have a sufficient sample size of property market transactions for each sector within each of the impact zones.

6.3.3 Findings of the Case Studies

As data on residential property sales is not readily accessible in Ireland, the author consulted local estate agents[27] operating in the case study areas. The author obtained details on a number of isolated residential property sales that

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25 Li, M. M. & Brown, H. J. (1980), Micro-Neighbourhood Externalities and Hedonic Housing Prices, *Land Economics*, Vol. 56, 125-140.

26 Pennington, G., Topham, N. & Ward, R. (1990), Aircraft Noise and Residential Property Values Adjacent to Manchester International Airport, *Journal of Transport Economics and Policy*, January, 49-59..

27 Hynes & Sons Ltd. & O'Meara Auctioneers in Athlone town were consulted with regard to the Ballydonagh landfill site, and Matthew Ryan & Sons and Town and Country Properties in Tipperary town were consulted with regard to the Donohill landfill site.

had taken place in the vicinity of both of the landfill sites in question during the relevant pre- and post-development study periods. However, due to the fact that landfill sites in Ireland tend to be located in sparsely populated rural areas, difficulties were encountered in attempting to obtain a sufficient sample size of residential property market transactions that took place within the vicinity of both of the landfill sites under consideration. This problem is further exacerbated by the fact that in rural Ireland, people do not tend to move house to the same extent as they do in the larger towns and cities.

As the residential properties located in close proximity to the landfill sites were most likely to be affected, an impact zone of zero to 500 metres was selected for analysis. In the case of the Donohill landfill site, there were only thirteen residential properties located within 500 metres of the landfill site, and only one of these properties had been sold during the pre-determined study periods. Similar problems were encountered in the Ballydonagh case study, where only twenty residential properties were located within 500 metres of the landfill site, and only two of these had been sold within the pre-determined study periods. Therefore, due to the insufficient sample sizes obtainable, the author was unable to test the suitability of this method for application to the EIA process in Ireland. However, even in instances where a sufficient sample size could be obtained, such as a large urban area, the problems regarding the inaccessibility of data on residential property market transactions still remain.

6.4 THE BENEFITS/ COSTS TRANSFER METHOD

The Benefits/ Costs Transfer Method is used to quantify the potential impact of a proposed development on property values by reference to the results of previous property value studies, such as hedonic pricing studies, that have quantified how similar type developments impacted on property values in other areas.

From an Irish viewpoint, Rogers (1992)[28] suggests that this method could be applied in the Irish EIA process. However, as no property value studies have been undertaken in Ireland to date, Rogers suggests using the results from property value studies undertaken in other countries. In this regard, he states that the results of a survey undertaken by Pearce and Markandya in 1991 of hedonic price air pollution studies for seven major cities in North America[29], could be broadly applicable to an urban area such as Dublin City[30]. However, Powe et al (1995)[31] disagrees with this viewpoint, and states that it is very difficult to make useful comparisons between the results of various empirical studies. This is primarily due to the fact that the majority of such studies have been undertaken in the USA, Canada and Australia, where different housing preferences and markets pertain. Even within the USA, the results obtained from similar studies differ due to the availability of data, the derivation of variables, the differences in methodology and the differences between the study areas[32]. Pearce and Markandya (1989)[33] re-iterate this point by stating that the results of completed studies can be used to inform and guide subsequent research, but their applicability to other urban areas is limited due to the differences in context and approach. For the reasons outlined above, it would be inappropriate to apply the results of property values studies undertaken in countries such as the USA, Canada and Australia to an Irish situation. However, given the similarities between the Irish housing market and the UK housing market, it may be possible, under well-defined

28 Rogers, M. (1992), Pricing the Environment, *Engineer's Journal Divisional Report*, April, 52-55, p. 55.

29 The findings were that residential property values declined by between 0.09 and 0.5 per cent per one per cent increase in pollution levels.

30 Rogers, M. (1992), Pricing the Environment, *Engineer's Journal Divisional Report*, April, 52-55, p. 55.

31 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147, p. 145.

32 Powe, N. A., Garrod, G. D. & Willis, K. G. (1995), Valuation of Urban Amenities Using an Hedonic Price Model, *Journal of Property Research*, Vol. 12, 137-147, p. 145.

33 Pearce, D. W. & Markandya, A. (1989), *Environmental Benefit Estimation: Monetary Evaluation*, OECD, Paris.

conditions[34], to broadly apply the results of property value studies undertaken in the UK to an Irish situation. However, to date, primarily due to the inaccessibility of the requisite data, no studies have been undertaken in Ireland to test whether this is a valid proposition.

6.5 Conclusion

This chapter concludes that, at present, it is not possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process. This is primarily due to the lack of public access to accurate and detailed information on both property transactions and environmental considerations. It is possible that the timing of this study is premature, and that modes of recording and accessing data will improve in the future.

However, even if data on property market transactions were available and readily accessible, the hedonic pricing method and the 'before and after' study methods could only be considered for application in a limited number of cases, due to the sample sizes required to undertake such studies. Nearly sixty per cent (59.3%) of the development proposals for which EIS's were submitted in Ireland during the ten year review period, were proposed for areas with a population of less than 5,000 persons. As was evident from the Fruit of the Loom case study, even if the requisite data were available, the volume of property transactions in an area with a population of less than 5,000, and perhaps higher, is insufficient for the purposes of undertaking a quantitative-based property value assessment.

In light of the fact that, at present, it is not possible to devise a suitable quantitative methodology for property value assessment for application in the Irish EIA process, it is the author's opinion that the standard of qualitative assessment of the potential impacts of proposed developments on property

[34] Brookshire and Neill (1992) argue that "benefit transfers are valid under well-defined conditions" in Garrod, G. & Willis, K. G. (1999), *Economic Valuation of the Environment – Methods and Case Studies*, Edward

values should be substantially improved. In this regard, those undertaking such assessments could have regard to the five-stage approach to assessment as advocated by Lee (as detailed in Section 4.2.2).

Elgar Publishing Limited, UK, p. 334.

CONCLUSIONS & RECOMMENDATIONS

CONCLUSIONS & RECOMMENDATIONS

The primary objective of this thesis was to establish whether the potential impacts of proposed developments on surrounding property values should be considered in the Irish EIA process. This thesis concludes that property values should be considered in the Irish EIA process.

The author's research indicates that in excess of 25% of EIS's being submitted in Ireland consider the potential impact of the proposed development on surrounding property values. However, the relevant provisions of the EC Directive on EIA (EC Directive EC/97/11) and the corresponding Irish legislation (Part X of the Planning & Development Act 2000 and Part 10 of the Planning & Development Regulations 2001) are ambiguous and provide no clear direction on the issue of whether property values should be considered in the EIA process. This thesis argues that property values should be considered in the Irish EIA process for the following reasons. Impacts on property values are economic impacts, and as such, they should be considered in the EIA process, due to the fact that the socio-economic environment is an important component of the 'environment' and it is inextricably linked with the bio-physical environment. Impacts on property values could conceivably be considered under two aspects of the environment (as listed in Part (b) of Paragraph 2 of Schedule 6 of the Planning & Development Regulations 2001) namely, "Material Assets" and "Human Beings". This is due to the fact that impacts on property values are impacts on the value of "material assets" i.e. land and buildings and they are also impacts on the economic well-being of "human beings". In Ireland, the vast majority of EIS's that consider 'impacts on property values' do so under the heading of "Material Assets". All of the planners, EIA consultants and developers interviewed for the purpose of this study that were of the opinion that property values should be considered in the EIA process, felt that property values should be considered under the heading of "Material Assets" as impacts on property values are impacts on land/ buildings which are "material assets". The author concurs with this view.

Although property values should be considered in every EIA, the potential impact of the proposed development on property values should only be included in the EIS in instances where the potential impact is likely to be significant.

The secondary objective of this thesis was to establish whether it was possible to devise a suitable quantitative methodology for carrying out property value assessment within the Irish EIA process. In this regard, this thesis concludes that, at present, it is not possible to formulate and test a suitable quantitative methodology for carrying out property value assessment for application within the Irish EIA process.

Quantitative assessment methods that have been applied in property value studies elsewhere in the world can not be applied in an Irish context at present. The hedonic pricing method is the primary quantitative method that has been applied in property value studies; with the 'before and after' study method and the benefits/ costs transfer method being applied to a more limited extent. It proved impossible to test the suitability of any of these methods for application in an Irish situation due, primarily, to the lack of public access to accurate and detailed information on property market transactions and environmental considerations.

However, even if the requisite data were available and readily accessible, quantitative approaches to property value assessment could only be considered in the case of developments that were proposed to be developed in large urban areas. This is due to the fact that a substantial volume of property market transactions for similar type properties within neighbourhoods or impact zones (depending on which method is applied) in the study area must be amassed for the purposes of undertaking the statistical analysis. Obviously, the larger the sample size, the more credible and reliable the results of the study will be. The majority of the hedonic pricing studies that have been undertaken in recent years have used sample sizes of in excess of one thousand property transactions. However, in Ireland, nearly sixty per cent

(59.3%) of the development proposals for which EIS's were submitted during the ten year review period, were proposed for areas with a population of less than 5,000 persons. As was evident from the Fruit of the Loom case study, even if the requisite data were available, the volume of property transactions in an area with a population of less than 5,000, and perhaps significantly higher, is insufficient for the purposes of undertaking a quantitative-based property value assessment.

Furthermore, even if the requisite data were readily available and accessible, due to the considerable time and monetary resources required to undertake a quantitative property value assessment, it is probable that such an assessment would only be considered in the case of a major development that was likely to significantly affect surrounding property values.

Therefore, due to the absence of a suitable quantitative approach for carrying out property value assessment within the Irish EIA process, the potential impacts of proposed developments on property values are assessed on a qualitative basis. It is the author's opinion that property value assessment is superficially treated in a considerable number of EIS's being submitted in Ireland. Mr. Conor Skehan, Director of CAAS Environmental Services Limited, the consultants responsible for preparing the National Guidelines (on behalf of the Environmental Protection Agency) concurs with this view.

Recommendations

The recommendations of this thesis are as follows:

- EC Directives on EIA and the corresponding Irish legislation should specifically provide for the consideration of potential impacts of proposed developments on property values.

- The term 'environment' should be explicitly defined for the purposes of EIA to include both the bio-physical and the socio-economic environments.

- The European Commission/ Irish Government should explicitly define the meaning of the term "Material Assets" in the context of EIA.

- The National Guidelines on Information to be Contained in Environmental Impact Statements and the accompanying Advice Notes should be revised to provide a clear direction on the issue of property value assessment.

- In the absence of a suitable quantitative methodology for carrying out property value assessment within the Irish EIA process, the standard of qualitative assessment should be improved. Qualitative property value assessment should be based on a sound qualitative framework such as that advocated by Lee (as detailed in Section 4.2.2.).

- The Irish Government should legislate for the provision of a central register of property market transactions in order to facilitate access to detailed and accurate information on property market transactions for property research purposes. Such a register would facilitate the development of quantitative approaches to property value assessment for application in the Irish EIA process.

- Modes of recording data, such as environmental considerations, should be improved.

- If the requisite data becomes available in an appropriate form, a number of hedonic pricing studies and 'before and after' studies should be carried out to examine the impact that existing developments have had on surrounding property values and the possible transferability of the results of such studies should be examined.

APPENDICES

APPENDIX 1

Environmental Research Unit
An tAonad Taighde Comhshaoil

St. Martin's House, Waterloo Road, Dublin 4. Ireland.

Telephone: (01) 602511. Telex: 30846. Fax: 680009.

your reference | our reference KM/MP | date 30 April 1992

Mr Gerald Walker
Vice Principal
College of Technology
Bolton Street
Dublin 1

Dear Gerry

In the ERU we are forming a research and reference collection of EISs submitted in Ireland in accordance with the requirements of the EC Directive. We have already published an inventory of those submitted in the period June 1988 to December 1990.

We are now interested in carrying out analyses of these EISs to assess their quality in terms of the coverage of subject matter and the adequacy of the treatment. A particular subject that has been either omitted, or unsatisfactorily treated, is the possible effects of major development on property. We would very much welcome the possibility of a post-graduate student working in this area to identify what the shortcomings have been and to devise an approach and methodology that could be adopted in carrying out future assessments in this area. We would give full access to our holding of EISs to your research student and offer him/her the full help and cooperation of our staff.

There are many other aspects of EISs which we wish to assess and these could provide opportunities for other research students to undertake work which could be of practical benefit to the operation of the EIA system in Ireland. If you have students who would be interested in this type of research, let me know and we could arrange to meet for a chat.

With best wishes.

Yours sincerely

Ken

Ken Mawhinney
Head
Planning, Library & Publications Section

APPENDIX 2

APPENDIX 2

HEDONIC PRICING STUDIES UNDERTAKEN WORLD-WIDE

Author	Year of Study	Country	Location	Topic of Study
McLure (1969)	Not Reported	United States	Los Angeles	Aircraft Noise
Mason (1971)	1971	Australia	Sydney	Aircraft Noise
Roskill (1971)	Not Reported	United Kingdom	Heathrow and Gatwick	Aircraft Noise
Coleman (1972)	Nor Reported	United States	Los Angeles	Aircraft Noise
Emerson (1972)	1967	United States	Minneapolis	Aircraft Noise
Dygert (1973)	1970	United States	San Francisco and San Jose	Aircraft Noise
Gautrin (1975)	1968 to 1969	United Kingdom	Heathrow	Aircraft Noise
de Vany (1976)	1970	United States	Dallas	Aircraft Noise
Anderson & Wise (1977)	1969 to 1971	United States	North Springfield, Towson and Four Areas	Road Transport Noise
Bailey (1977)	1968 to 1976	United States	North Springfield	Road Transport Noise
Holsman & Aleksandric (1977)	1959 to 1973	Australia	Sydney	Aircraft Noise

Author	Year of Study	Country	Location	Topic of Study
McCalden & Jarvie (1977)	1962 to 1974	Australia	Newcastle, NSW	Road Transport Noise
Maser (1977)	1971	United States	Rochester	Aircraft Noise
Abelson (1978)	1972 to 1973	Australia	Sydney	Aircraft Noise
Dept. of Environment, Housing & Community Development (1978)	1974 to 1975	Australia	Eppalock, Central Victoria	Land Quality
Hall, Breston & Taylor (1978)	1975 to 1977	Canada	Toronto, Canada	Road Transport Noise
Harrison & Rubinfield (1978)	1970	United States	Boston	Air Quality
Mieszkowski & Saper (1978)	1969 to 1973	Canada	Etobicke and Mississauga in Toronto	Aircraft Noise
Nelson (1978)	1970	United States	Washington DC	Aircraft Noise
Nelson (1978)	1970	United States	Washington DC	Road Transport Noise
Allen (1980)	1977 to 1979	United States	Tidewater, North Virginia	Road Transport Noise
Mark (1980)	1969 to 1970	United States	St. Louis	Aircraft Noise
Palmquist (1980)	1958 to 1978	United States	Kingsgate, North King County and Spokane	Road Transport Noise
Brookshire, Thayer, Schulze & d'Arge (1982)	1978	United States	Los Angeles	Air Quality

Author	Year of Study	Country	Location	Topic of Study
Gamble & Downing (1982)	1979	United States	Harrisburg, Pennsylvania	Radiation
Holsman & Bradley (1982)	1980	Australia	Sydney	Road Transport Noise
Holsman & Paparoulas (1982)	1972 to 1981	Australia	Sydney	Rail Transport Noise
Hoffman (1984)	Not Reported	Norway	-	Aircraft Noise
Miranowski & Hammes (1984)	1974 to 1979	United States	Iowa	Land Quality
Gardner & Barrow (1985)	1977 to 1979	United States	Wisconsin	Land Quality
Mattinson & Morrison (1985)	1984	Australia	Peel Harvey Estuary, W.A.	Water Quality
O'Byrne, Nelson & Seneca (1985)	1970 to 1972, 1979 to 1980	United States	Atlanta	Aircraft Noise
Opschoor (1986)	Not Reported	The Netherlands	Amsterdam	Aircraft Noise
Smith & Desvousges (1986)	1984	United States	Acton and Boston, Massachusetts	Land Quality
Bennett (1987) in Yapp (1989)	1985	Australia	Wagga Wagga, NSW	Land Quality
Payne, Olshansky & Segal (1987)	1973 to 1982	United States	Kerr-McGee Site in West Chicago, Illinois	Radiation
Holmes (1988)	1984	United States	Water Treatment Facilities throughout USA	Water Quality

Author	Year of Study	Country	Location	Topic of Study
King & Sinden (1988)	1979 to 1985	Australia	Manilla Shire, NSW	Land Quality
Burns & Associates (1989)	1988	Australia	Adelaide	Aircraft Noise
Giannias (1989)	1980	United States	Houston, Texas	Air Quality
Kirshner & Moore (1989)	1985	United States	Tiburon on a Peninsula of Marin County in North San Fransisco	Water Quality
Michaels & Smith (1989)	1977	United States	Boston	Land Quality
Palmquist & Danielson (1989)	1979 to 1980	United States	North Carolina	Land Quality
Zeiss & Atwater (1989)	1983 to 1986, 1983 to 1987	United States	Tacoma, Washington (Landfill); Salem, Oregon (Incinerator)	Landfill; Incinerator
BIS Shrapnel Pty. Ltd. (1990)	1988	Australia	Sydney	Aircraft Noise
Brucato, Murdoch & Thayer (1990)	1984	United States	San Francisco Bay Area, California	Air Quality
McClelland, Schulze & Hurd (1990)	1985	United States	Montebello and Monterey Park, Los Angeles	Land Quality
Pennington, Topham & Ward (1990)	1985 to 1986	United Kingdom	Manchester International Airport	Aircraft Noise

Author	Year of Study	Country	Location	Topic of Study
Kohlhase (1991)	1976 to 1985	United States	Harris County, Houston	Toxic Waste Sites
Maani & Kask (1991)	1983, 1984, 1986	New Zealand	Mount Roskill, Auckland	Infrastructure
Dryland Salinity Management Working Group (1992)	1992	Australia	NSW, Victoria and South Australia	Land Quality
Garrod & Willis (1992)	1985 to 1989	United Kingdom	Central England and the Welsh Borders	Forestry
Hirshfield, Vesilind & Pas (1992)	1989	United States	-	Land Quality
Hughes & Sirmans (1992)	1985 to 1989	United States	Baton Rouge Metropolitan Area, Louisiana	Road Traffic Noise
Ketkar (1992)	1980	United States	New Jersey	Land Quality
Mendelsohn, Hellerstein, Huguenin, Unsworth & Brazee (1992)	1969 to 1988	United States	New Bedford, Massachusetts	Water Quality
Nelson, Genereux & Genereux (1992)	1979 to 1989	United States	Ramsey, Minnesota	Infrastructure
Steinnes (1992)	Not Reported	United States	Minnesota	Water Quality
Gatzlaff & Smith (1993)	1971 to 1990	United States	Miami, Florida	Transport

Author	Year of Study	Country	Location	Topic of Study
Uyeno, Hamilton & Biggs (1993)	1987 to 1988	Canada	Vancouver International Airport, British Columbia	Aircraft Noise
Clark & Nieves (1994)	1976 to 1980	United States	76 areas throughout US	Infrastructure
Collins & Evans (1994)	1985 to 1986	United Kingdom	Stockford, Manchester International Airport	Aircraft Noise
Levesque (1994)	1985 to 1986	Canada	Winnipeg International Airport	Aircraft Noise
Mitchell McCotter (1994)	1993	Australia	Sydney	Aircraft Noise
Nairn, Segal & Watson (1994)	1994	Australia	Melbourne, Victoria	Road Transport Noise
Hamilton & Schwann (1995)	1985 to 1991	Canada	Vancouver	Infrastructure
Halstead, Bouvier & Hansen (1997)	1995	United States	Belchertown, Massachusetts	Landfill

Source: New South Wales Environment Protection Authority Envalue Study Database @ http://www.epa.nsw.gov.au/envalue/

APPENDIX 3

APPENDIX 3

CASE STUDIES FOR HEDONIC PRICING METHOD

CASE STUDY NO. 1 – FRUIT OF THE LOOM, BUNCRANA, CO. DONEGAL

Preamble

This case study attempted to use the hedonic pricing method to quantify the impact that increased disposable income in Buncrana town, due to Fruit of the Loom locating there, had on residential and commercial property values and on development land values in the area.

In 1987, the long established Buncrana firm W. P. McCarter & Co. Ltd. entered into a joint venture with the American based 'Fruit of the Loom' firm, the market leader in underwear and leisure wear manufacture in America, and undertook a massive industrial expansion. This resulted in employment in W. P. McCarter & Co. Ltd.'s rising dramatically from approximately 400 in 1987[1] to c. 1,600 in 1994[2] in Buncrana alone. In total, Fruit of the Loom opened five plants in County Donegal - two in Buncrana, one in Malin, one in Raphoe and one in Milford, and a sixth plant was opened in Derry City. Perhaps with the exception of Derry City, the Fruit of the Loom plants had a significant impact on the towns in which they were located and on the surrounding hinterlands. This was primarily due to increased spending due to a growth in disposable incomes and it resulted in an increased demand for housing and rented accommodation in the areas.

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1 Buncrana Urban District Council, Buncrana Urban District Draft Development Plan 1992.

2 Difficulties were encountered in attempting to obtain exact figures for the number of people employed in the Fruit of the Loom plants in Buncrana town.

This was particularly evident in Buncrana town, as at the time of the expansion, the population of the town and its environs[3] was only 4,131[4]. Accordingly, the creation of c. 1,200 new jobs in the two Buncrana plants over a relatively short period of time had a very dramatic impact on the town. The 1992 Draft Development Plan for Buncrana Urban District[5] states:

> *"From 1987 onwards, the development of the 'Fruit of the Loom' was both a real and psychological turning point for the town ..... The resulting increased spending power in the area had a very visible impact, in terms of greatly increased private house building in the town and environs and the refurbishment and improvement of many commercial premises in the town centre"* (Page 7).

Profile of Buncrana Town

With a recorded population of 4,553[6] in the 1996 Census of Population[7], Buncrana is the second largest town in County Donegal and is the predominant town on the Inishowen Peninsula. The town is set in a very scenic location on the Eastern shores of Lough Swilly, a narrow sea inlet extending northwards from Letterkenny to the Atlantic Ocean. Buncrana is located thirty-five kilometres from Letterkenny, the largest town in County Donegal, and twenty-two kilometres from Derry City in Northern Ireland. Its proximity to Derry City and the Border has considerably influenced, and in some ways hindered, the development of Buncrana town over the years.

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3 The Environs are under the jurisdiction of Donegal County Council. They are defined for Census purposes to include that part of Luddan bounded by the Barrack Road and the shore south of the entrance to the North Western Golf Club. To the north, it includes that area out to the Cockhill Bridge and along the Dunree Road to the Council Housing Scheme.

4 Central Statistics Office (1988), *Census 86 - Volume 1 Population Classified by Area*, Stationary Office, Dublin.

5 The Development Plan for Buncrana UDC was adopted in 1995 which was subsequent to the completion of this study on Buncrana Town.

6 This figure includes Buncrana Town and its Environs.

7 Central Statistics Office (1997), *Census 96 - Volume 1 Population Classified by Area*, Stationary Office, Dublin.

Figure A.1: Map Illustrating the Location of Buncrana Town Relative to Derry City, Letterkenny and Carndonagh

As Buncrana is the largest town on the Inishowen Peninsula, it has traditionally served as a retail and service centre and as a major centre for industrial employment for a considerable part of the Inishowen Peninsula and North County Donegal. The importance of the town as a market centre has fluctuated over the years and has significantly declined in recent years. This is largely due to the attractiveness of shopping in Derry City when there is disparity between the Punt (now the €uro) and Sterling and, to a lesser extent, it is due to the development of increased retail and service outlets in both Letterkenny and Carndonagh. Carndonagh, which is located nineteen kilometres from Buncrana town, has become the market centre of the Inishowen Peninsula.

Buncrana has a long tradition in manufacturing industry. Until the 1970's, the town was the main industrial centre in County Donegal and had been for many years. Most employment was in the textile and clothing industries and almost two-thirds of the jobs available were for women[8]. Manufacturing employment increased significantly in Letterkenny during the 1970's and early 1980's, during which time it overtook Buncrana as the County's main industrial centre. In 1973, the Industrial Development Authority designated Buncrana as a growth centre to serve the Inishowen Peninsula, and in the early 1980's they built an advance factory of 2,230 square metres on land that they owned at Ballymacarry Lower[9]. Due to the peripheral nature of the area, the IDA had little success in attracting industries to Buncrana town during this period. In the 1980's, the numbers employed by the local firm of W. P. McCarter & Co. Ltd were increasing and they moved to Ballymacarry Lower and rented fifty per cent of the then vacant IDA-built advance factory. In 1987, it was a major coup for the IDA to attract Fruit of the Loom to enter into partnership with W. P. McCarter & Co. Ltd. in Buncrana and to undertake a massive industrial expansion in order to manufacture textile goods for export. To facilitate the industrial expansion, the entire IDA advance factory at Ballymacarry Lower was purchased by W. P. McCarter and Co. Ltd. As part of the agreement, McCarters Ireland Ltd. were to be the owner of all the fixed assets, with Fruit of the Loom as the parent company. The Irish operation became the only European Fruit of the Loom manufacturing operation, producing ninety-five per cent of the garments sold under the two brand names, Fruit of the Loom and Screen Stars, in the European market. It was also the only Fruit of the Loom manufacturing operation located outside of their North American operations. At the time that this study was undertaken, Fruit of the Loom were the biggest private sector manufacturing employer in the Republic of Ireland.

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[8] Buncrana Urban District Council, Buncrana Urban District Draft Development Plan 1992.

[9] Buncrana Urban District Council, Development Plan for Buncrana Urban District 1981.

Fruit of the Loom Plants in Buncrana Town

At the time that this study was undertaken, Fruit of the Loom had two plants in Buncrana town, one at Shore Road and one at Ballymacarry Lower on the Derry Road; there was also a smaller unit with a factory shop in the centre of the town (Refer to Figure A.2). They manufacture t-shirts and sweatshirts made from a cotton or a cotton/ polyester mixture. The knitting and bleaching/ dyeing part of the process was carried out at the Shore Road plant, while the assembly of the garment into the finished product and despatching of it was carried out at the Ballymacarry Lower plant.

Figure A.2: Photograph showing the location of the Fruit of the Loom Shore Road and Ballymacarry Lower Plants in Buncrana

At the time of this study, the total area occupied by Fruit of the Loom in Buncrana town was as follows:

Ballymacarry Lower plant	25,871 sq. m.
Shore Road plant	22,200 sq. m.
Main Street	996 sq. m.
Total Area Occupied	49,067 sq. m.[10]

At the time that this study was undertaken, there were c. 1,600 people employed in the Fruit of the Loom plants in Buncrana town. Difficulties were experienced in attempting to obtain definitive figures on the number of people employed in the Buncrana plants. Information provided by the Personnel Department of Fruit of the Loom related to the aggregate number employed by Fruit of the Loom in all of their plants in County Donegal; the total number of employees was 2,223 in 1993. However, the Donegal County Branch of SIPTU stated that 1,575 Fruit of the Loom employees in the Buncrana plants were members of SIPTU in November 1993[11]. Details provided by both Fruit of the Loom and SIPTU in 1993 indicated that about two-thirds of those employed were women and that the workforce was relatively young with c. 55 - 60% of those employed being under twenty-five. SIPTU's figures indicated that in 1993, eighty of the employees in the Buncrana plants were under eighteen, and Fruit of the Loom's aggregate figures revealed that 205 of the total number employed in their plants in County Donegal were under eighteen; this equated to nearly ten per cent of the total workforce. In each year since Fruit of the Loom located in Buncrana town, there have been a large number of secondary school pupils leaving school prior to sitting their Leaving Certificate to go and work for Fruit of the Loom[12]. Workers at the Shore Road plant are almost exclusively male, while the plant at Ballymacarry Lower tends to be dominated by female employment.

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10 Rating Appeal undertaken by Mr. Pat McCarroll (ARICS) for Fruit of the Loom, 1993.

11 Details provided by Mr. George Hunter, District Secretary of the Donegal County Branch of SIPTU.

12 Mr. McCannagh, the Vice-Principal of Buncrana Vocational School, in an interview with the author stated that there were as many as twenty or thirty early school-leavers in his school each year. No equivalent figures were available for Scoil Mhuire, the Convent of Mercy.

Buncrana Town Prior to the Arrival of Fruit of the Loom

Prior to Fruit of the Loom locating in Buncrana in 1987, development within the town was slow and low key in both the private and public sectors. The overall appearance of the centre of the town, particularly Upper and Lower Main Street, was drab and uninviting and private investors generally lacked the confidence to invest in the town.

Retail activity was very sluggish and there were a large number of vacant commercial premises on Lower and Upper Main Street; a number of which had been converted back to residential use. There were also significant arrears in payment of commercial rates over a period of years[13]. The proximity of the town to Derry City and the tradition of cross Border shopping, particularly when the Punt was strong relative to Sterling, had contributed significantly to this decline.

Manufacturing industry was the biggest employment sector in the town with 342 persons employed in this area in 1986[14]; this equates to 37.5% of the total number of people employed in the town at that time. It is likely that a large percentage of these people were employed by W. P. McCarter & Co. Ltd. as there were no other large manufacturing employers in the town during this period. However, despite this, unemployment levels in the town were relatively high. The unemployment rate in Buncrana in 1986 was over ten per cent, with 292 persons recorded as being unemployed in the 1986 Census of Population[15]. Also, the area tended to suffer from relatively high rates of male unemployment as most of the industries within the town were dominated by female employment.

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13 Buncrana Urban District Council, Buncrana Urban District Draft Development Plan 1992.

14 Central Statistics Office (1988), Census 86 - *Small Area Population Statistics for Buncrana Town & Environs*, Stationary Office, Dublin.

15 Central Statistics Office (1988), Census 86 - *Small Area Population Statistics for Buncrana Town & Environs*, Stationary Office, Dublin.

Impact of Fruit of the Loom on Buncrana Town

From 1987 onwards, the expansion undertaken by Fruit of the Loom was "a real and psychological turning point"[16] for the town of Buncrana. There was a general air of optimism in the town and increased consumer and investor confidence were evident.

The population of the town and its environs increased by 6.2% between the 1986 and the 1991 Census' of Population; this was a very considerable increase in light of the fact that the overall population of Donegal County fell by 1.2%[17] over the same period. This increase was primarily attributed to the number of people moving to Buncrana because of the employment provided by Fruit of the Loom and also to the number of emigrants returning to Buncrana because of the improved economic climate. Some existing businesses in the area expanded and a number of new businesses started up, including some satellite businesses directly servicing Fruit of the Loom. These included an engineering firm, a joinery firm and a company manufacturing packaging materials.

However, the positive influence of Fruit of the Loom on Buncrana town was not fully realised due to two factors. Firstly, a large percentage of the employees of Fruit of the Loom lived outside Buncrana town and its environs and commuted to work from other parts of the Inishowen Peninsula and the North County Donegal area. The widely-held view of business proprietors in Buncrana town[18] was that these employees tended to spend a very small percentage of their income on goods and services in the town. This was attributed to the fact that most of them were bused in and out of work and also because very few of them left the factories during their lunch break as subsidised canteens were provided. Secondly, the range of retail outlets in

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[16] Extract from Page 7 of the Buncrana UDC Draft Development Plan 1992.

[17] Central Statistics Office (1993), *Census 91 - Volume 1 Population Classified by Area*, Stationary Office, Dublin.

[18] The author distributed a questionnaire to the 119 businesses in Buncrana town in 1993. 45 questionnaires were returned; representing a 38% response.

Buncrana was very limited and a large amount of money was being exported out of the town either through cross-Border shopping in Derry city or through people travelling to Carndonagh or Letterkenny to avail of the wider choice of retail outlets.

However, the increased spending power in Buncrana town generated directly and indirectly by Fruit of the Loom had a very visible impact. It manifested itself primarily in terms of greatly increased private house building in the town and its environs and in the refurbishment and improvement of many commercial premises in the town centre. The overall appearance of the town was improved and a major scheme was undertaken which gave Upper and Lower Main Street a 'facelift'. This involved placing the overhead cables underground, repaving the footpaths, renewing the street lighting and furniture and planting trees in the area.

Undeniably, the upsurge in development activity in Buncrana was to a large extent fuelled by the growth of Fruit of the Loom. However, a major new sewerage network was built in Buncrana around the same time as the Fruit of the Loom expansion. This involved the provision of a sewerage treatment plant and substantial extensions of the mains network, with the result that almost all of the land within Buncrana town was then served by the public sewer. Prior to these improvements, it was very difficult to obtain planning permission for new development in some areas of the town because of insufficient sewerage provisions. This resulted in a lot of people purchasing sites in the County Council area outside the town and its environs and building houses there[19]. Therefore, some of the new house-building that has taken place in Buncrana town since Fruit of the Loom expanded is attributable to the improvements in the sewerage network. It is impossible to quantify what percentage of the new house-building is attributable to increased spending power in the town or to improvements in the sewerage network. However, as it was a statutory health requirement for Buncrana UDC to carry out such improvements to the sewerage network, the author is assuming that the

[19] Source: Interview with Mr. Paul Doyle, Town Clerk, Buncrana UDC.

majority of new house-building in Buncrana town and its environs is attributable to the demand created by the expansion of Fruit of the Loom.

Increase in Land and Property Values

The massive industrial expansion undertaken by Fruit of the Loom in Buncrana had a positive impact on land and property values in the area. However, as a large percentage of the employees commute to work from other parts of the Inishowen Peninsula and North County Donegal, the effect on property and land values in Buncrana town has not been as pronounced as one might have expected by the creation of an extra c. 1,200 jobs in a relatively small town.

The increases in value were not consistent across all sectors of the property market. Residential property values and the value of development land and sites for one-off houses increased quite considerably whereas increases in the value of commercial property were nominal.

Residential Property Values

In 1994, Buncrana was considered the second most expensive location in County Donegal, after Letterkenny town, in which to purchase residential property. However, local estate agents[20] stated that there was no quick upsurge in residential property values in the initial years after Fruit of the Loom moved to the town and that in these years, values only increased by c. 6-10% per annum. This could probably be attributed to the fact that over fifty per cent of the workforce were less than twenty-five years of age, and therefore, were probably not in a financial position to buy a house initially. However, in the early 1990's, demand increased and values increased considerably; by up to 15% per annum in some sectors of the residential market[21].

[20] Mr. Brian Sherrard of William Grant Estate Agents and Mr. Leo Porter of Porter Properties, Buncrana.

[21] Information provided by Mr. Brian Sherrard of William Grant Estate Agents, Buncrana.

Development Land and One-Off House Site Values

The value of development land and sites for one-off houses increased very considerably between 1987 and 1994; with values effectively doubling. In 1987, the value of a one acre site on the outskirts of the town was c. £8,000; in 1994, the value had increased to c. £15,000. Again, this can probably be attributed to the young age profile of the workforce as a lot of the employees would have been first time buyers. In order to avail of the First Time Buyers Grant of £2,000, most of them would have purchased a new house in a multiple development or have built a new home on a site that they either inherited or purchased.

Commercial Property Values

When a large industry such as Fruit of the Loom moves into a small town, shops and businesses usually flourish, with a resultant increase in value. However, despite the fact that some of the commercial properties, particularly on Upper and Lower Main Street, had been refurbished and improved since Fruit of the Loom located in the town, commercial property values increased very little over the period 1987 to 1994. Local estate agents stated that it was difficult to quantify the increase as different circumstances pertained to the various commercial properties and some were better located and in a better condition than others. In fact, since 1987 when Fruit of the Loom located in the area, a number of premises that were previously used as commercial premises became vacant or were converted back to residential use.

The development of the commercial sector in Buncrana has always been hindered by the proximity of the town to Derry city and the long-established tradition of cross-Border shopping, particularly for weekly and durable shopping. The improvement in the range of retail outlets and services in Carndonagh and Letterkenny, particularly since it was granted Urban Renewal Status, also created a threat. Subsequently, a lot of disposable income was being exported out of Buncrana each week. The retail space within Buncrana was being used inefficiently. Most of the commercial properties within the town were located on Upper and Lower Main Street and

most of them were relatively small and family owned. At the time that this study was undertaken, there was only one small supermarket in the town and the range of retail outlets was very limited. Buncrana has a considerable population catchment in its hinterland but the above factors deterred people from shopping in the town. This is evident from the results of the Census of Services 1988[22] which showed that Buncrana served a retail catchment area only slightly greater than its resident population at that time. For 1988, the weekly sales per head of population in Buncrana are recorded as being £24.90, whereas the equivalent figure for the town of Carndonagh is £32.30[23]. Again, this clearly indicated that the population of Buncrana were shopping elsewhere.

Environmental Considerations

As one would expect with an operation of the scale of Fruit of the Loom, some concerns were raised about the possibility of environmental degradation in Buncrana town. The fact that the factories are located so close to Lough Swilly resulted in Fruit of the Loom being blamed for the poor water quality in the area and there have been numerous reports of the water in Lough Swilly turning red, yellow, orange, green, blue, etc. from excessive amounts of the effluent which arises from the bleaching and dyeing processes being discharged into the foul sewer, and thence out to sea. Some locals complained about air pollution claiming that there were regular emissions of black smoke coming from the chimneys and emissions of fine, sand-like grit and that there were constant emissions of steam which had a strong chlorine bleach smell which lingered in the air, particularly on damp days. A number of residents living adjacent to the factories complained of the occasional noise disturbance from the tannoy system which was used for paging people in the factories 24 hours a day. Local environmentalists set up the Buncrana

[22] Central Statistics Office (1991), *Census of Services 1988 - Volume 1 Detailed Results for Retail and Wholesale Trade*, Stationary Office, Dublin.

[23] Central Statistics Office (1991), *Census of Services 1988 - Volume 1 Detailed Results for Retail and Wholesale Trade*, Stationary Office, Dublin.

Concerned Residents Association Group to campaign for improved environmental conditions in Buncrana.

Application of the Hedonic Pricing Method

It was proposed to apply the Hedonic Pricing Method in an attempt to quantify the impact that increased disposable income in Buncrana town, due to Fruit of the Loom locating there, had on the capital values of new and second-hand residential properties, commercial properties and on development land in the area. A secondary objective of the analysis was to identify the sphere of influence of the negative externalities experienced by the residents living in close proximity to the Shore Road and the Ballymacarry Lower plants and to quantify what impact they had on property values in the areas. The negative externalities included increased pedestrian and vehicular traffic and the resulting increases in noise and pollution, noise from the tannoy system, air emissions, noxious smells, etc.

Cross-Section v's Time Series Data

For the purposes of undertaking multiple regression analysis, data can be taken on a time series (small number of similar properties over a period of years), cross-section (larger number of diverse properties at a point in time), or on a pooled data basis (amalgamation of both the time series and the cross-section approaches). Even though most of the hedonic pricing studies that have been undertaken have used cross-section data, the author considered this approach inappropriate for the study of Buncrana town due to the insufficient sample sizes for the various types of properties which were generated by the sale or letting of such properties at a given point in time.

As there were only 1,259 households recorded in Buncrana town and its environs in the 1991 Census of Population[24] and 54 business outlets recorded

[24] Central Statistics Office (1993), *Census 91 - Small Area Population Statistics for Buncrana Town & Environs*, Stationary Office, Dublin.

in the 1988 Census of Services[25], it was expected that the number of properties offered for sale or for letting in any one year would be relatively small. Table A.1 details the number of newspaper advertisements for all types of properties/ land for sale or to let within Buncrana town and its environs for two sample years of 1988 and 1989. These two years were selected as Fruit of the Loom had begun its expansion at this stage, and therefore it was reasonable to assume that there would be increased activity in the property market in Buncrana town.

Table A.1: Details of Newspaper Advertisements for Properties In Buncrana Town & Environs for the Calendar Years 1988 & 1989

Type of Property	*Number of Advertisements in 1988*	*Number of Advertisements in 1989*
Residential Properties for Sale (All Types)	31	54
Residential Properties to Let (All Types)	21	3
Development Land for Sale	2	4
Sites suitable for Single Dwellings for Sale	7	7
Residential Farms for Sale	3	2
Commercial Properties for Sale	7	7
Commercial Properties to Let	6	2
Total	**77**	**79**

Source: Back Issues of the Derry Journal and Donegal Democrat for the calendar years 1988 & 1989.

[25] Central Statistics Office (1991), *Census of Services 1988 - Volume 1 Detailed Results for Retail and Wholesale Trade*, Stationary Office, Dublin.

In total, seventy-seven and seventy-nine types of properties were advertised in the calendar years of 1988 and 1989, with the majority of these being residential properties for sale. Based on the figures detailed in Table A.1, the author decided that the only category for which a reasonably adequate sample size could be obtained was for residential properties for sale.

As discussed in Section 5.2.6, some of the literature reviewed advocates using rental evidence in preference to sales evidence where it is available. This is due to the fact that it gives a clearer indication of willingness to pay for the current levels of the attributes of the property as opposed to sales evidence which reflects both the current levels and expected future levels of the attributes of the property. Even though a large number of residential properties were advertised for letting, particularly in 1988, the author has decided not to use this data as only some of the advertisements relate to long-term lettings. A large number of the advertisements relate to short-term holiday lettings, and therefore are of little relevance to this particular study.

Thirty-one residential properties were advertised for sale in 1988 and fifty-four were advertised in 1989. Such figures by themselves provide an insufficient sample size for use in the multiple regression analysis on a cross-section basis without further diluting them into categories such as detached houses, semi-detached houses, bungalows, terraced townhouses, apartments, etc. Also, it is probable that there may have been a number of properties advertised which were not sold and therefore the above figures may be reduced further.

Taking the above factors into consideration, the author decided that it was appropriate to collect data on residential properties offered for sale on a time series basis as opposed to a cross-section basis. However, a major disadvantage of using time series data is that variables for external influences such as interest rates, inflation and mortgage rates have to be included in the hedonic pricing equations so that their influence on changes in residential property values are taken into consideration.

Study Period

Fruit of the Loom undertook major industrial expansion in Buncrana town in 1988. This is evidenced by the fact that the number of people employed in manufacturing in Buncrana town increased from 799 in 1987 to 1,370 in 1988[26]; a 71% increase. There are no official figures available as to how many of these jobs were created by employers other than Fruit of the Loom; although the numbers are likely to be nominal as there were no other large manufacturing employers in the town.

The study period runs for a ten year period from the 1st of January 1984 to the 31st of December 1993. This incorporates a four year period prior to expansion in 1988 in order to establish trends in the residential property market and a five year period after 1988 in order to establish what impact Fruit of the Loom locating in Buncrana town had on residential property values both in the short and the medium term.

Study Area

For the purposes of this study, the study area was defined as the area covered by Buncrana Town and its Environs, as defined for Census purposes[27].

Data Set

Therefore, for the reasons outlined, it was proposed to confine the hedonic pricing study to an analysis of the effect increased disposable income in Buncrana town and its environs had on the capital values of second-hand

[26] Information extracted from Table on Page XVI in the EIS for the Expansion of Fruit of the Loom's Shore Road Plant, Buncrana (1989).

[27] The Environs are under the jurisdiction of Donegal County Council. They are defined for Census purposes to include that part of Luddan bounded by the Barrack Road and the shore south of the entrance to the North Western Golf Club. To the north, it includes that area out to the Cockhill Bridge and along the Dunree Road to the Council Housing Scheme.

residential properties. Separate hedonic pricing equations had to be developed for each of the distinct types of second-hand residential properties for each of the study years. These included detached houses; semi-detached houses; terraced townhouses; bungalows in multiple developments; dwellings on 0.2 hectare[28] or larger sites; and apartments.

In each of the hedonic pricing equations, the dependent variable was property price and the independent variables were property characteristics, neighbourhood variables, locational and accessibility variables, environmental variables, rate of new residential development and finally, external influences, such as interest rates, inflation and mortgage rates. The target variable, or the variable under investigation, was the increase in disposable income.

Each of the separate hedonic pricing equations developed for the various types of second-hand residential properties had then to be analysed for each of the study years 1984 to 1993. By estimating separate hedonic pricing equations for each year, the need to express all the house price data in constant prices was removed. In order to carry out this exercise, an extensive amount of data on all of the variables outlined above needed to be collected and collated for each of the study years under consideration.

Property Price Details

It was necessary to amass information on all the residential property sales that had occurred in Buncrana town and its environs in each of the study years 1984 to 1993. As there was no readily available information on property transaction prices, it was deemed necessary to examine newspaper advertisements for residential properties that had been offered for sale in the town and its environs, and with the assistance of local auctioneers, to try and ascertain which properties had been sold. The vast majority of properties offered for sale were advertised in either or both of the two regional weekly newspapers circulating in the Buncrana area, namely the Derry Journal and

[28] 0.2 hectares equates to approximately 0.5 of an acre.

the Donegal Democrat. The author examined back issues of both of these newspapers and extracted details on all of the residential properties advertised for sale within the period July 1983 to December 1993. It was deemed necessary to include the six month period of July to December 1983, as some of the sales for properties advertised during this period may have been completed in the calendar year 1984.

It was evident that the properties offered for sale in Buncrana town were principally advertised by one of four auctioneers operating in Buncrana over the period (Mr. Sean Furey, Mr. William Grant, Mr. Sean McLaughlin, and Mr. Leo Porter of Porter Properties), by Neal J. Doherty, an auctioneer in Carndonagh, or by one of a number of estate agencies operating in Derry City, such as Nationwide Anglia, James O'Doherty & Co., P. Andrews Estate Agents and Halifax Property Services.

As afore-mentioned, the number of residential properties offered for sale in any given year was relatively small. The author felt that it was imperative to collect information on all of the residential properties offered for sale in an attempt to obtain an adequate sample size for the various types of residential properties being analysed for each of the years under consideration.

All of the auctioneers in Buncrana town, Carndonagh and Derry City who had advertised residential properties for sale within the study years were contacted and asked to provide further details on each of the advertised properties. In particular, they were asked to provide information on the actual selling price of the property and when the sale had been completed. However, a number of problems were encountered in attempting to carry out this exercise. Firstly, Mr. Sean McLaughlin, one of the auctioneers operating in Buncrana town had retired and closed his business in the early 1990's. Secondly, a number of auctioneers were unwilling to provide such information for a number of reasons; these included that the information was confidential; that they did not have the resources to go back through their files and records

to access the information; and that some files and records relating to the earlier study years in particular were unavailable.

With only partial information regarding the residential properties offered for sale in each of the study years, it was impossible to proceed with the study as an adequate sample size for each of the types of residential properties could not be amassed.

Variables Detailing Property Characteristics

The property characteristics that the author proposed to use in the hedonic pricing equations for each of the various types of residential properties were as follows:

- House Type (detached; semi-detached; terraced townhouse; bungalows in multiple development; dwelling on 0.2 hectare or larger site; apartment)
- Total Floor Area
- Number of Bedrooms
- Presence of a Garage
- Plot Size
- Central Heating Type
- Number of Bathrooms
- Age
- Off-Street Car-Parking.

It was proposed to input some of the above variables into the hedonic pricing equations as dichotomous variables for the reasons outlined in Section 5.2.7.

Neighbourhood Variables

The Central Statistics Office published Small Area Population Statistics on Buncrana Town and its Environs for each of the Census years 1981, 1986 and 1991. Unfortunately, the statistics relate to the entire area (i.e. both the

town and its environs) and detailed information is not provided on sub-areas or neighbourhoods within the area. In the absence of such detailed Census information, the author proposed to define Buncrana town and its environs into a number of sub-areas as suggested by Cooley et al (1994)[29] and detailed in Section 5.2.8. A possible solution was to use the area within the town (e.g. Main Street, West End, Shore Road, etc.) or the name of the townland (e.g. Ballymacarry Lower, Ballymacarry Upper, Ardaravan, Tullyarvan, etc.) that the property is located in as a neighbourhood variable. It was assumed that this would provide an approximate proxy measure which would be representative of the characteristics of neighbouring houses and households and the quality of the micro-environment within that area, and therefore, represent all the desirable and undesirable characteristics associated with that particular area of the town.

In the multiple regression analysis, it was proposed to include the name of the area of the town or townland as a dummy variable i.e. each area or townland would be included as a variable and for that particular variable, each property would be coded either with 1 (to represent the fact that the property is located in that particular area or townland) or 0 (to represent the fact that the property is located in another area or townland). This would allow the multiple regression technique itself to estimate the varying influence of each area on property values as opposed to it being pre-determined.

Locational and Accessibility Variables

Apart from the properties located in the centre of the town, all the other properties are addressed on a townland basis. Therefore, in a lot of instances it would not be possible to establish the exact location of some of the properties and it would be very difficult to measure the exact distance from say, Main Street or the Fruit of the Loom plants on either Shore Road or in

[29] Cooley, R. E., Pack, A. D., Hobbs, M. & Clewer, A. D. E. (1994), A Genetic Algorithm for Modelling Location Effects on Residential Property Prices, *Proceedings of the Cutting Edge Property Research Conference of the RICS*, September, London.

Ballymacarry Lower. In order to overcome this problem, the author proposed that the name of the area of the town or the townland that the property is located in which was being used as a neighbourhood variable, could double as an approximate measure for proximity to the Main Street or the Fruit of the Loom plants in the town. Proximity to the Main Street would be considered advantageous as all the main commercial and service facilities are located in the centre of the town, whereas proximity to the Fruit of the Loom plants would be considered disadvantageous because of the negative externalities experienced by too great a proximity to the industrial plants. These include increased pedestrian and vehicular traffic and the resulting increases in noise and pollution; noise from the twenty-four hour tannoy system, etc.

Environmental Variables

As no independent environmental tests were commissioned by Buncrana UDC between 1987 and 1994 (when this case study was abandoned) to establish if Fruit of the Loom was responsible for any form of air, water or noise pollution, no data was available to represent the environmental variables in the statistical analysis. It was hoped that any disamenity experienced by households due to a deterioration in environmental conditions would be represented in the neighbourhood variable. For example, it was reasonable to assume that all properties in Church Street or Shore Road which are located adjacent to the Fruit of the Loom Shore Road plant would have been affected by the same levels of environmental disamenity, and that this would be represented in the neighbourhood variable.

It should be noted that in 1988 Fruit of the Loom commissioned EOLAS[30] to carry out tests on the effluent discharged into Lough Swilly and on the atmospheric and noise emissions from the Shore Road plant. The results were detailed in the Environmental Impact Statement that supported the planning application for the proposed expansion of their Shore Road plant. Their findings indicated that all discharges and emissions were within the

[30] EOLAS (1989), *Environmental Report on the Proposed Expansion to Fruit of the Loom International Ltd.*

recommended levels and therefore, posed no cause for concern. However, the results of these tests were disregarded for the purposes of this analysis, as they relate only to the discharges and emissions from the Shore Road plant and as they were carried out in 1988, they do not represent the full effects of the industrial expansion.

Measure of Rate of New Residential Development

It was considered necessary to include a variable which would represent the rate of new residential development in the Buncrana area in the hedonic pricing equation. Obviously, the supply of new houses coming on stream would have some bearing on the demand for second-hand residential properties in the area, which in turn, would affect the value of such properties. Over the study period, there were a number of speculative residential developments built in the area which primarily comprised of semi-detached houses and bungalows aimed at first time buyers, such as the St. John's Park and Loughview developments in Ballymacarry. It was also necessary to take account of the number of one-off residential dwellings which were constructed in the area over the study period. Traditionally in the Buncrana area, as with most small towns in the Republic of Ireland, a large percentage of people either inherit a site from their parents or a relative or they purchase a site independently and, subsequent to obtaining planning permission, build their own homes. Therefore, both of the above factors had some bearing on the demand for and the prices achieved for second-hand residential properties and as such, had to be represented in the analysis.

In an attempt to quantify the rate of development of new residential dwellings in the area, it was proposed to examine all the planning applications submitted between 1983 and 1992 and to extract details on all the new residential dwellings for which full planning permission or approval had been granted within this period. It was assumed that if full planning permission or approval was granted for a new residential dwelling, that the dwelling would

have been constructed and have been ready for occupation in the year after full planning permission or approval was granted.

The author visited the offices of Buncrana Urban District Council and examined all the planning files for planning applications submitted between the 1st of January 1983 and the 31st of December 1992. Details on all the planning applications submitted to Buncrana UDC for new residential dwellings for which full planning permission or approval was granted between 1983 and 1992 were collated. Details are provided in Table A.2.

Table A.2: Number of New Residential Dwellings for which Full Planning Permission or Approval was Granted for in the Buncrana UDC Area 1983 - 1992

Year	No. for which Full Planning Permission was Granted	No. for which Approval was Granted	Total
1983	47	0	47
1984	170	2	172
1985	21	1	22
1986	9	2	11
1987	16	0	16
1988	16	2	18
1989	11	2	13
1990	16	3	19
1991	49	3	52
1992	3	1	4

Source: Compiled from Planning Files of Buncrana UDC 1983 - 1992.

The environs of Buncrana are under the jurisdiction of Donegal County Council. Permission to view all the planning files for planning applications submitted for developments in the Environs of Buncrana during the period 1983 to 1992 was requested. As there were seventy-four planning applications submitted during this period[31], Donegal County Council denied

[31] Details provided by Ms. Gay Moynihan, Senior Executive Planner, Donegal County Council.

permission to carry out such an exercise due to the prohibitive amount of work involved for their personnel. However, Ms. Gay Moynihan, a Senior Executive Planner, forwarded details on a sample of thirty-one planning applications covering the period 1987 to 1991. The number of new residential dwellings for which full planning permission or approval was granted during this period extracted from the sample provided are detailed in Table A.3.

Table A.3: Number of New Residential Dwellings for which Full Planning Permission or Approval was Granted for in Buncrana Environs 1987 - 1991 (as Extracted from Sample Provided)

Year	No. of Full Planning Permissions Granted	No. of Approvals Granted	Total
1987	0	0	0
1988	13	0	13
1989	4	1	5
1990	10	1	11
1991	1	0	1

Source: Compiled from Sample of Details on Planning Applications Submitted as provided by Donegal County Council.

In an attempt to obtain accurate details on the number of new residential dwellings constructed in the environs of Buncrana during the period 1983 to 1992, the author contacted the Regional Office of the Electricity Supply Board in Sligo town to find out how many ESB connections had been made to new houses in the Buncrana area over that period. They were willing to provide details on the total number of connections made to new houses in each year for the Buncrana area. However, it transpired that the boundaries for the Buncrana area that the ESB use cover a larger area than the boundary definitions for Census purposes that have been used in this study to define the area covered by Buncrana town and its environs. The author then requested the addresses of the new hoses to which ESB connections had been made so as to attempt to distinguish which ones were within the boundaries of Buncrana town and its environs. However, the ESB were

unwilling to provide such details as they have a policy of not releasing customer details.

As a final resort, the author contacted Mr. Eamonn Leahy of the Environmental Research Unit (within the Department of the Environment and Local Government) to see if he had carried out any research on the construction of new private residential development in Buncrana as part of the annual sample survey of house building that he undertakes with Michael Finn for the ERU[32]. Unfortunately, Buncrana had not been included in any of the sample surveys undertaken by Mr. Leahy.

External Influences

Average annual figures for interest rates, inflation and mortgage rates for each of the study years 1984 to 1993 were to be included in the hedonic pricing equations, as they are external factors which can have a considerable influence on the value of second-hand residential properties.

Measure of the Increase in Disposable Income in Buncrana Town

Methodology

It was first necessary to calculate the increase in the number of people employed by Fruit of the Loom in the Buncrana plants for each of the study years 1984 to 1993. An assumption was then made that if these employees were not gainfully employed by Fruit of the Loom in Buncrana town, that they would have little prospect of finding alternative employment in Buncrana, and as such the vast majority of them would either be claiming unemployment benefit/ assistance or have moved from the area in search of alternative employment. If they had moved from the area, it was assumed that their earnings would have been spent elsewhere and Buncrana town would not have benefited from them. There was a possibility that a number of the

[32] Finn, M. & Leahy, E. (1991), *Private Housebuilding 1991 - Findings of a Sample Survey of Estate and Single Houses*, Stationary Office, Dublin.

employees would have found alternative employment in Buncrana, and therefore, the town would have continued to have benefited from their disposable income. In an attempt to calculate what disposable income the employees would have had if they had not been employed by Fruit of the Loom, the author assumed that each of them would have been claiming unemployment benefit/ assistance. It is likely that this approach would have resulted in an over-estimate of the aggregate disposable income as some of the people would have moved from the area in search of alternative employment as opposed to being unemployed. However, as some of the employees may have obtained alternative employment in Buncrana, it was assumed that these two factors cancelled each other out. Therefore, it was necessary to calculate the aggregate amount which these people would have been entitled to claim in unemployment benefit/ assistance and supplementary welfare allowances if they were not employed in the Fruit of the Loom plants in Buncrana town.

It is important to note that this study only deals with the increase in disposable income generated by those Fruit of the Loom employees who live in Buncrana town and its environs. This was considered necessary as over fifty per cent of the employees of the Fruit of the Loom plants in Buncrana town commute to work from all parts of the Inishowen Peninsula and North County Donegal, and therefore the income generated in the Fruit of the Loom plants in Buncrana has a much greater sphere of influence than just Buncrana town. It is outside the remit of this study to consider the impact of Fruit of the Loom on any geographical area other than Buncrana town and its environs.

For each of the study years under consideration (1984 to 1993), it was proposed to calculate the aggregate increase in disposable income by subtracting the aggregate amount that would be paid out in unemployment benefit/ assistance and supplementary welfare allowances if these people were unemployed, from the aggregate amount of net annual earnings of those Fruit of the Loom employees living in Buncrana town and its environs.

The final step was to apply the multiplier effect to the computed aggregate increase in disposable income in each of the study years under consideration. This was to take account of the secondary or follow-on effects associated with the spending of the increased disposable income in the Buncrana area.

Data Collection

In order to complete this task, an extensive amount of information was required regarding Fruit of the Loom's employees for each of the study years 1984 to 1993. Details were required on the number of people employed in the Buncrana plants in each year and on whether or not they lived in Buncrana town and its environs, their age, sex and marital status and their net annual earnings. A breakdown of the number of people working in the different areas, such as management, administration, cutting, dyeing, sewing, packing, cleaning, etc. was also required. The collection of such information was an arduous task. Mr. Terry Kelly, the Personnel Manager of Fruit of the Loom, initially agreed to assist the author in her study. However, after many months it became apparent that Mr. Kelly was reluctant to provide information regarding his employees for a number of reasons. Firstly, the information was considered of a confidential nature; secondly, the information that Fruit of the Loom hold on record is aggregate information for all of their County Donegal plants as opposed to just the Buncrana plants; and thirdly, because of the time factor involved in accessing and collating such a large volume of information. The situation was further exacerbated by the fact that Fruit of the Loom only fully computerised their personnel records in 1992 and some of the information required for the years 1984 to 1992 would have had to have been acquired by searching through old files and records.

Calculation of Aggregate Net Earnings

It would have been ideal if the Personnel Manager of Fruit of the Loom had provided the author with details of the net aggregate earnings of employees in the Buncrana plants from the weekly or monthly payrolls or from the PAYE tax returns for the employees for each of the study years 1984 to 1993. However, the only information which Fruit of the Loom would furnish was the aggregate

gross wages bill for all of their plants in County Donegal for the years 1987 to 1993 as detailed in Table A.4. Details were not provided for the years 1984 to 1986 as this period was prior to 1987, when the joint venture between Fruit of the Loom and W. P. McCarter & Co. Ltd. took place, and the information was regarded as confidential.

Table A.4: Aggregate Gross Wages Bill for all of the Fruit of the Loom Plants in County Donegal

Year	Gross Wages Bill (Millions)
1987	£6.35 M
1988	£10.32 M
1989	£14.28 M
1990	£16.61 M
1991	£18.67 M
1992	£20.32 M
1993	£24.89 M

Source: Mr. Terry Kelly, Personnel Manager, Fruit of the Loom International, Buncrana.

In a further attempt to obtain the relevant information, the author requested permission from the Personnel Manager to include a questionnaire with the pay slips for each of the employees in the Buncrana plants. The information requested was age, gender, marital status, if the employee lived in Buncrana town or its environs, when the employee began working in the Fruit of the Loom and their average weekly or monthly net earnings. The questionnaires would have been collected locally in the Fruit of the Loom plants. This request was refused.

The author then requested permission from the Personnel Manager to visit the Buncrana plants and to survey a sample of the employees in the Buncrana plants. Again this request was refused.

Finally, the Personnel Department provided information on the aggregate number of employees in all of their plants in County Donegal in 1993. An age and gender breakdown was also provided, details of which are illustrated in Table A.5.

Table A.5: Breakdown by Age and Gender of all the Fruit of the Loom Employees in the County Donegal Plants in 1993

Age Category	Male	Female	Total	% of Total
Under 18	39	166	205	9.2%
18 - 25	328	875	1,203	54.1%
25 - 30	130	244	374	16.8%
30 - 35	65	95	160	7.2%
Over 35	95	186	281	12.7%
Total	657	1,566	2,223	100%

Source: Mr. Terry Kelly, Personnel Manager, Fruit of the Loom International Ltd.

As these figures are aggregate figures relating to all of the Fruit of the Loom factories in County Donegal and as they relate to only one of the study years in question, they are of little use. In a final attempt to obtain the relevant information, the author contacted the District Secretary of the Donegal Branch of SIPTU, the Union which represents the Fruit of the Loom employees. As their computer system was 'live' and they did not keep historic records, the only information which they were able to provide related to a single point in time, November 1993. They provided details on the number of people employed by the Fruit of the Loom plants in Buncrana with an age and gender breakdown for November 1993. Details are provided in Table A.6.

Table A.6: Gender Breakdown of Fruit of the Loom SIPTU Members in the Buncrana Plants as at November 1993

Age Group	*Male*	*Female*	*Total*	*% of Total*
Under 18	17	63	80	5.1%
18 - 20	124	225	349	22.2%
21 - 25	218	309	527	33.5%
26 - 30	120	113	233	14.8%
Over 30	171	208	379	24.1%
Unknown Age	2	5	7	0.4%
Total	652	923	1575	100%

Source: Mr. George Hunter, District Secretary of Donegal County Branch of SIPTU.

The Donegal County Branch of SIPTU also provided details on the registered address of each of the Fruit of the Loom employees in the Buncrana plants as at November 1993. Table A.7 illustrates that only 697[33] of the 1,575 SIPTU members of Fruit of the Loom employed in the Buncrana plants in November 1993, have Buncrana town or one of the surrounding townlands as their registered address. This represents just 44.3% of the total figure.

[33] Details provided by Mr. George Hunter, District Secretary of Donegal County Branch of SIPTU.

Table A.7: Breakdown by Address of Fruit of the Loom SIPTU Members in the Buncrana Plants as at November 1993

Address	*Number of Employees*
Buncrana Town	555
Ahilly	5
Ballymacarry	16
Ballymagan	46
Clonbeg	9
Cockhill	40
Gransha	5
Luddan	11
Tullyarvan	6
Straboe	4
Address in Buncrana	697[34]
Address outside Buncrana	878
Total	1575

Source: Mr. George Hunter, District Secretary of Donegal County Branch of SIPTU.

These findings would seem to broadly concur with those of Ms. Claire Bradley, a student from Thornhill College in Derry City, who carried out an assessment of the social and economic impact of the Fruit of the Loom industry on Buncrana town in 1992. With the assistance of Mr. Terry Kelly, the Personnel Manager at Fruit of the Loom, seventy-five questionnaires were randomly distributed to Fruit of the Loom employees in the Buncrana plants. Fifty questionnaires were returned. Even though the sample was random and the number of questionnaires distributed was small, she found that only fifty-four per cent of those surveyed lived within six kilometres of the Buncrana plant in which they worked. Also, the Small Area Population Statistics for

[34] It is a possibility that this figure is slightly inaccurate, as strictly speaking, some areas of the townlands of Ahilly, Ballymacarry, Ballymagan, Gransha, Luddan and Tullyarvan are located outside the boundaries of Buncrana Town and its Environs.

Buncrana Town and its Environs for 1991 state that only 956 employees in manufacturing industry live in Buncrana town and its environs, thereby indicating that a large number of employees commute to the town from other areas.

Average Industrial Wage

As a last resort, the author could have used Central Statistics Office data to calculate the average salaries of the management and administrative staff and the average gross annual wage for industrial workers in the textile industry. For example, the annual average payment (gross) for days worked for industrial workers in the textile industry in 1992 was £10,750[35] (for enterprises with 200 or more employees). Alternatively, the Economic Series published by the CSO provides data on the average gross weekly earnings of both male and female employees in manufacturing industry.

Table A.8: Average Gross Weekly Earnings and Computed Average Gross Annual Earnings for Male and Female Workers in the Manufacturing Industry 1984 to 1993

Year	Average Gross Weekly Earnings		Computed Average Gross Annual Earnings	
	Male	*Female*	*Male*	*Female*
1984	£184.40	£110.16	£9,588.80	£5,728.32
1985	£201.98	£119.61	£10,502.96	£6,219.72
1986	£216.66	£129.64	£11,266.32	£6,741.28
1987	£227.30	£137.25	£11,819.60	£7,137.00
1988	£237.69	£145.53	£12,359.88	£7,567.56
1989	£247.86	£150.77	£12,888.72	£7,840.04
1990	£257.17	£156.60	£13,372.84	£8,143.20
1991	£268.57	£162.46	£13,965.64	£8,447.92
1992	£277.83	£171.86	£14,447.16	£8,936.72

Source: Central Statistics Office (1993), *Economic Series December 1993,* Stationary Office, Dublin.

[35] Central Statistics Office (1995), *Labour Costs Survey, 1992 in Industry, Distribution, Credit, Insurance and Business Services*, Stationary Office, Dublin.

However, the employees of the Fruit of the Loom plants in Buncrana comprise of management, administration staff, cutters, dyers, sewers, packers, despatchers, cleaners, canteen staff, etc. The first problem was that no breakdown of the number of staff working in each area were available and secondly, some of the employees were paid salaries, some were paid set hourly rates, some were paid on a shift work basis and some, such as the sewers, were paid on a piecework basis. Without a breakdown of the numbers employed in each area, it was impossible to even attempt to quantify the aggregate gross earnings of the employees working in each area using CSO data. Even if this were possible, a further problem was that this would only provide details on gross earnings and information regarding the employees individual circumstances would be required in order to compute their net earnings as per the income tax rates and allowances for PAYE workers (both single persons and married couples) for each tax year.

Unemployment Benefit/ Assistance and Supplementary Welfare Allowances

The aggregate amount that the Fruit of the Loom employees living in Buncrana town and its environs would be entitled to in unemployment benefit/ assistance and supplementary welfare allowances if they were not employed by Fruit of the Loom had to be calculated for each study year. In order to do this, details on the age, gender and marital status of each employee were required. Age details were particularly important as people under eighteen are not entitled to claim unemployment benefit/ assistance and in 1993 about c. five per cent of the workforce in the Buncrana plants were under eighteen[36]. For those employees that were married, details on the working status of their spouse were also required in order to calculate their full entitlements. Again, this information was inaccessible.

[36] Refer to Table No. A.6.

Unemployment Benefit/ Assistance

The Department of Social Welfare provided details on the short and long term weekly unemployment assistance rates for both single and married persons for each of the years 1984 to 1993; as detailed in Appendix No. 4. The average between the short and the long term weekly rates was calculated for both single and married persons and this was multiplied by fifty-three (payments) to give an annual unemployment assistance rate for both single and married persons. Fifty-three payments were allowed for as opposed to fifty-two weekly payments, as claimants received an extra week's benefit/ assistance in December for Christmas expenses. Table A.9 details the computation for the 1993 rates.

Table A.9: Short and Long Term Unemployment Assistance Rates (Urban Area) for 1993

	Rate	Average Weekly Rate	Computed Annual Rate
Single Rate			
Short Term	£55.60	£57.40	£3,042.20
Long Term	£59.20		
Married Rate			
Short Term	£91.50	£93.10	£4,934.30
Long Term	£94.70		

Source: Computed from data received from Mr. J. B. Doherty, Regional Manager for North Donegal Area, Department of Social, Community & Family Affairs.

The average between the short term and long term weekly rates for unemployment assistance for both single and married persons and the computed annual rates for both for the years 1984 to 1993 inclusive are detailed in Table A.10.

Table A.10: Average Weekly Rate between the Short and the Long Term Rates for Unemployment Assistance for Single and Married Persons (Urban Area) and Computed Annual Rates

Year	Average Single Weekly Rate	Computed Annual Single Rate	Average Married Weekly Rate	Computed Annual Married Rate
1984	£31.85	£1,688.05	£54.83	£2,905.99
1985	£33.85	£1,794.05	£58.28	£3,088.84
1986	£34.25	£1,815.25	£59.13	£3,133.89
1987	£35.30	£1,870.90	£60.95	£3,230.35
1988	£39.25	£2,080.25	£65.65	£3,479.45
1989	£44.50	£2,358.85	£72.45	£3,839.85
1990	£48.50	£2,570.50	£79.50	£4,213.50
1991	£52.50	£2,782.50	£85.50	£4,531.50
1992	£55.10	£2,920.30	£89.40	£4,738.20
1993	£57.40	£3,042.20	£93.10	£4,934.30

Source: Computed from data received from Mr. J. B. Doherty, Regional Manager for North Donegal Area, Department of Social, Community & Family Affairs.

Supplementary Welfare Allowances

Depending on their individual circumstances, there were a number of Supplementary Welfare Allowances that individuals or households claiming unemployment benefit/ assistance may have been entitled to. These included a medical card, rent supplement for private rented housing, family income support, one-parent family allowance, etc.

The Children's Allowance Benefit was not included in the computation as it is not means tested.

The General Medical Services (Payments) Board Annual Report for each of the study years included details on the average annual payment made to doctors for consultations and for payment for prescriptions under the General Medical Services Scheme for each holder of a medical card in the North-Western Health Board area. For each of the study years under consideration, details are illustrated in Table A.11.

Table A.11: Average Annual Value of a Medical Card to an Individual and a Household

Year	Overall Payment Per Eligible Patient (North Western Health Board Area)	Average No. of Persons covered by a Medical Card (National Figures)	Average Annual Value of a Medical Card to a Household
1984	£74.32	1.8	£133.78
1985	£81.58	1.8	£146.84
1986	£88.93	1.8	£160.07
1987	£92.20	1.8	£165.96
1988	£100.61	1.79	£180.09
1989	£125.65	1.78	£223.66
1990	£136.32	1.77	£241.29
1991	£141.92	1.75	£248.36
1992	£162.30	1.73	£280.78
1993	£171.87	1.71	£293.90

Source: Compiled from Annual Reports of the General Medical Services (Payments) Board 1984 - 1993.

It also proved difficult to quantify the annual benefit of the rent allowance on a private rented dwelling. The amount of this allowance was determined by reference to the amount of rent the person or household were paying for the property they were renting. Also, due to the fact that c. fifty-five per cent of the

employees of Fruit of the Loom were under twenty-five years of age, it was probable that a large number of them were still living in the family home and were not claiming a rent allowance.

Household Budget Survey

Due to the inaccessibility of the relevant information to compute the employees entitlement to unemployment benefit/ assistance and supplementary welfare allowances, the author tried a different approach. The Household Budget Survey, which is produced by the Central Statistics Office, records the average weekly State transfer payments received by a household living in an urban area where the head of the household is out of work as part of the households total average weekly disposable income. Table A.12 contains the relevant extracts from the 1980 and 1987 Household Budget Surveys[37].

As illustrated in Table A.12, the portion of the households weekly disposable income which was obtained from State transfer payments was £46.50 in 1980 and £95.28 in 1987. The author considered using these figures in the study and adjusting them upwards using the annual percentage change in the Consumer Price Index for each of the intervening years between 1980 and 1987 and 1987 and 1993. However, it was decided not to use these figures as they relate to the accumulative State transfer payments received by a household as opposed to those received by an individual within a household.

[37] Central Statistics Office (1984), *1980 Household Budget Survey - Volume 3 Detailed Results for Urban Households, Stationary Office, Dublin* and Central Statistics Office (1990), *1987 Household Budget Survey - Volume 2 Detailed Results for Urban and Rural Households*, Stationary Office, Dublin.

Table A.12: Average Weekly Household Disposable Income for an out of work Head of Household in an Urban Area - Extracts from the 1980 & 1987 Household Budget Surveys

	1980	1987
Direct Income		
Employees - Wages/ Salaries	30.155	42.855
Self-Employed - Non-Farm	0.025	0.861
Self-Employed - Farming	-	-
Retirement Pensions	0.383	1.559
Investment Income	0.183	0.711
Property Income	-	0.986
Own Garden/ Farm Produce	0.032	0.159
Other Direct Income	1.338	1.898
Total Direct Income	**32.116**	**49.028**
State Transfer Payments		
Children's Allowances	2.882	6.615
Old Age & Retirement Pensions	0.752	0.595
Widows and Orphans Pensions	0.343	0.851
Other Long Term Social Welfare	-	3.469
Unemployment Benefits & Assistance	28.219	65.681
Education Grants/ Scholarships	-	0.502
Other State Transfers	14.309	17.573
Total State Transfers	**46.505**	**95.286**
Gross Income	**78.621**	**144.314**
Direct Taxation		
Income Tax	4.906	7.250
Social Insurance	1.147	2.887
Total Direct Taxation	**6.053**	**10.137**
DISPOSABLE INCOME	**72.568**	**134.177**

Source: Household Budget Surveys 1980 & 1987.

The Multiplier Effect

It was considered appropriate to apply the multiplier effect to the aggregate increase in disposable income[38] created by Fruit of the Loom employees living in Buncrana town and its environs for each of the study years under consideration. This was to take account of the secondary or follow-on effects associated with the spending of the increased disposable incomes which were generated by Fruit of the Loom in the Buncrana area.

Empirical research on the size of the multiplier in Ireland suggests that the Marginal Propensity to Save is 0.26; the Marginal Propensity to Tax is 0.24; and the Marginal Propensity to Import is 0.4. This gives an overall multiplier effect of 1.11[39]. Therefore, an increase in income of say £1 million into an area should give rise to an increase in national income of £1.1 million. In international terms, this is a relatively small multiplier effect. This is due to the fact that Ireland is a small economy and is extremely open to international trade; and therefore, the relatively high level of imports reduces the multiplier effect.

However, the author has reservations about applying a multiplier effect of 1.11 in this study as it is based on research carried out on a national basis. As Buncrana is located only twenty-two kilometres from Derry City, it is likely that the tendency to import would be higher than the national average due to the long-established tradition of cross-Border shopping. This would result in a reduction of the multiplier effect. Similar concerns with regard to using the national multiplier of 1.11 were expressed by the authors of a study carried out in 1993 to examine the impact of Unifi Textured Yarns Europe Ltd. on Letterkenny town[40], which is located only thirty-five kilometres from Buncrana. They carried out a consumer spending survey in Letterkenny and found that

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38 Aggregate amount of net annual earnings of Fruit of the Loom employees living in Buncrana town and its Environs less the aggregate amount that would be paid out in unemployment benefit/ assistance plus supplementary welfare allowances if these people were unemployed.

39 Leddin, A. & Walsh, B (1992), *The Macro Economy of Ireland*, (2nd Edition), Gill and Macmillan, Dublin.

40 McMenamin, D. & Cannon, E. (1993), *Unifi Textured Yarns Europe Ltd. - An Economic Impact Study*, Business Studies Department, RTC Letterkenny.

only 4.9% of household expenditure could be attributed to cross-Border shopping. They concluded that the multiplier effect would be only marginally lower in the Letterkenny area than in the country as a whole. However, Letterkenny has a much wider range of retail outlets and services than Buncrana town, and therefore it was considered likely that the effect of cross-Border shopping would have a much greater impact on Buncrana than on Letterkenny. Accordingly, the multiplier applied to income generated in Buncrana should be less than 1.11.

Concluding Remarks on the Fruit of the Loom Case Study

This case study was abandoned in 1994, due to the inaccessibility of certain pertinent data. In particular, data on the profile and wage structure of the Fruit of the Loom workforce in the Buncrana plants; and comprehensive details on the residential property market transactions that had taken place during the study period 1984-1993 were unobtainable.

It must be borne in mind that data collection took pace simultaneously and that Fruit of the Loom had initially agreed to participate in this study. It only became evident after a lot of time and research had been invested in this case study, that Fruit of the Loom were unwilling to provide the relevant information with regard to the workforce of the Buncrana plants, which they had initially agreed to provide.

CASE STUDY NO. 2: NAVAN ROAD IMPROVEMENT, COUNTY DUBLIN

Preamble

This case study attempted to use the hedonic pricing method to quantify the impact that the Navan Road Improvement Scheme had on residential and commercial property values and on development land values in the area.

The Navan Road is the main arterial road which links Dublin City with the N3, the National Primary road which heads north-westwards out of Dublin in the direction of Navan, Kells and Cavan. The Navan Road runs from the junction of the Cabra Road and the Old Cabra Road in the City to the Clonee By-Pass at the Dublin/ Meath County boundary. The road passes through the primarily residential areas of Ashtown, Castleknock, Blanchardstown and Mulhuddart in north-west Dublin.

In the late 1980's and the early 1990's, the Navan Road was the subject of a major road improvement scheme which was part of an overall programme of extensive road development in County Dublin. The main impetus of this programme was the development of a motorway around the outskirts of the City, which was to comprise of the Northern and Southern Cross motorways and the Western Parkway motorway. These plans included a proposal for a major roundabout along the Navan Road at the point where the M50 Western Parkway motorway heading northwards ended and the Northern Cross motorway[41] began. Therefore, it was necessary to upgrade the Navan Road in order to ensure that it had the capacity to deal with the increased volumes of traffic that would be generated by vehicles entering onto or exiting off the motorway at this point. Another significant reason that contributed to the Navan Road improvements was that there was a proposal to develop a major town centre west of Blanchardstown village, but due to the volumes of traffic that such a development would generate, Dublin County Council stated that

[41] The Northern Cross motorway was still only a proposal when this case study was undertaken.

the Navan Road had to be upgraded and the Blanchardstown By-Pass built before they would consider such a proposal. Both of the above reasons necessitated the improvement of the Navan Road, and accordingly, it was widened to four lanes (two lanes in either direction) and a number of major roundabouts and interchanges were built along the route.

This study was undertaken in 1994 and Figure A.3 represents the road structure that was in place at that time. It should be noted that the link between the Navan Road and the Western Parkway motorway was only a temporary arrangement pending the completion of the Northern Cross motorway and the major interchange to link the Western Parkway, the Northern Cross motorway and the Navan Road.

Increase in Traffic Volumes

Traffic volumes on the Navan Road have increased significantly since the road improvement works were completed and particularly, since access to the M50 Western Parkway motorway was provided from the Navan Road. However, the author was unable to quantify definitively the increase in traffic volumes over the study period. The National Roads and Traffic Flows reports which were published annually by the Environmental Research Unit were referred to. The ERU calculated the Annual Average Daily Traffic[42] travelling along specific sections of the Navan Road within the Dublin County boundaries. However, due to the momentous volume of work and personnel required to conduct traffic counts, they were not undertaken on an annual basis, and instead, the ERU carried out a one-day seven hour visual count at the mid-point of a section of the route and corrected the results from the seven hour count by reference to the appropriate permanent traffic station[43].

In 1987, the figure for the Annual Average Daily Traffic at the traffic signals North of Blanchardstown was 12,763 vehicles, including ten per cent heavy

[42] This relates to a 24 hour, two-way flow on an average day.

[43] Golden, J. M. (1993), *National Roads and Traffic Flow 1992*, Stationary Office, Dublin.

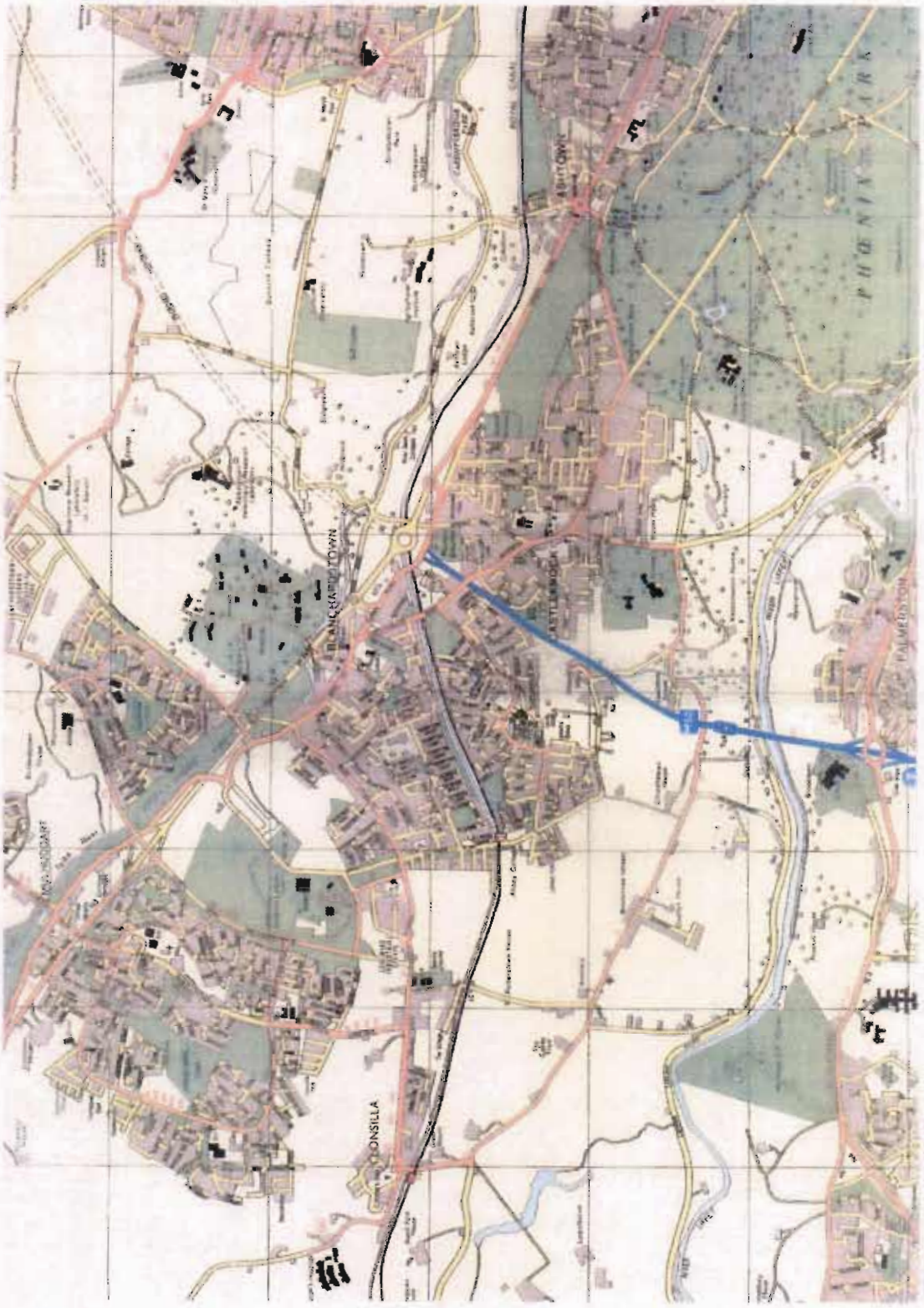
goods vehicles. At the time that this study was undertaken, the latest available figures for the volume of traffic travelling along the Navan Road related to the year 1992. In this year, the ERU estimated that on an average day there were between 19,859 and 25,325 vehicles travelling along the section of the Navan Road that is the subject of this study; with ten to twelve per cent of these being heavy goods vehicles (HGV's). The reason for the range of figures was because traffic counts were conducted at four individual stretches of the road within the Dublin County area. The 1992 figures are estimated and are based on a traffic count that took place in 1990. The 1992 results are detailed in Table A.13.

Table A.13: Estimated Annual Average Daily Traffic (AADT) at Various Locations on the Navan Road in 1992

Location	Estimated AADT	% of HGV
Diamond Interchange Clonsilla & Coolmine	25,325	10%
Small Roundabout Blanchardstown	19,859	11%
Large Roundabout Toll Road M50	22,108	11%
Small Roundabout to Castleknock	21,953	12%

Source: Golden, J. M. (1993), *National Roads and Traffic Flow 1992*, Stationary Office, Dublin.

Figure A.3: Map illustrating the Road Structure in 1994 when the Navan Road Case Study was Undertaken



As the road structure was improved and changed, the traffic counts were carried out at different points along the road. The 1992 estimated AADT figures for the traffic count undertaken at the small roundabout in Blanchardstown were considered the most comparable to the AADT figures for the traffic count undertaken at the traffic signals north of Blanchardstown in 1987. Therefore, in the five year period between 1987 and 1992, the average traffic travelling along this section of the Navan Road increased by 7,096 vehicles; with a one per cent increase in the number of heavy goods vehicles.

However, as traffic counts were not taken annually and some of the estimated AADT's in the 1980's were based on traffic counts that had taken place up to nine years previous in some instances[44], it proved very difficult to quantify with any degree of precision, the increase in the volume of traffic travelling along the Navan Road over the study period. The situation was further exacerbated by the fact that as the road structure changed so did the particular points at which traffic counts were previously undertaken, and therefore the results for various years may refer to different stretches of road.

Impact of the Navan Road Improvement on Property Values

The Navan Road Improvement Scheme and the construction of the Blanchardstown By-Pass had a significant effect on properties in the area. A number of properties were either wholly or partly acquired under the Compulsory Purchase Order and the landowners were duly compensated. Other properties suffered devaluation, even though none of their landholding was acquired, due to the environmental disamenities associated with proximity to such a major road. However, overall, the Navan Road Improvement Scheme had a beneficial effect on property values in the area. Large tracts of land were opened up for both commercial and residential development, particularly around the Blanchardstown area and further

[44] Mr. Eoin MacNeill of the Traffic Section of Fingal County Council advised the author to disregard AADT's which were based on traffic counts which had taken place more than three years previous.

westwards. The improvements in the road structure, and particularly the development of the Western Parkway motorway which opened to traffic in 1990, improved the attractiveness and accessibility of the area both as a residential and a commercial location.

At the time that this study was undertaken, the Navan Road improvements had been completed for less than two years, and as such, the study was only concerned with the short-term effects on residential and commercial property values in the area. If the relevant data were available, it would be very interesting to carry out a study now to determine the long-term effects of the road improvements on the area. In the intervening years, the profile of the area has changed significantly. The northern leg of the motorway, the Northern Cross motorway, was constructed which improved accessibility to and from the north of the city and Dublin Airport; Blanchardstown Shopping Centre and Retail Parks (the 'Town Centre') were developed and have been trading very successfully; a large number of business and office parks have been developed and are providing employment for a large number of people; an Institute of Technology has opened; and thousands of new residential dwellings, primarily aimed at first-time buyers, have been developed in the area.

Application of the Hedonic Pricing Method

It was proposed to apply the Hedonic Pricing Method in an attempt to quantify the impact that the Navan Road Improvement Scheme had on the value of residential and commercial properties and development land located within relatively close proximity to it. It was expected that property values in the study area would have been positively influenced by the improved accessibility, to the city centre and to Blanchardstown and the Western Parkway (M50) motorway, which were created by the road improvement. However, some properties located in close proximity to the road would also have experienced negative externalities, such as increased traffic, noise,

fumes, disturbance, etc. which would have had a negative influence on their values.

Study Period

It was proposed to undertake a before and after study to determine the effects that the Navan Road Improvement Scheme had on commercial and residential property values in the area. It was considered necessary to study a period prior to the road proposals being included in the relevant Development Plan for the area in order to establish a base-line study; a period prior to the road improvements being undertaken; and a period after the road improvements had been completed.

The proposals for the Navan Road Improvement Scheme and the Blanchardstown By-Pass were first shown in considerable detail on the 1983 Dublin County Council Development Plan[45]. This plan had been in draft form since 1981, and therefore, it was necessary to select a study year prior to this in an attempt to establish a base-line study which was representative of property values in the area before they were affected by the announcement that major road improvements were to take place. The author proposed to use 1980 as a base-line study year.

The Navan Road Improvement Scheme was carried out over the period 1991 - 1992 and the construction of the M50 Western Parkway motorway was undertaken in the late 1980's and it opened to traffic in 1990. Therefore, the author considered it necessary to select a study year prior to the construction of the M50 motorway, so that the results would not be biased by this. It was proposed to use 1987 as the study year to represent the period prior to the construction works taking place. In this study year, it was expected that property values would have been affected to some degree by the anticipated road improvement works.

[45] Refer to Map No. 10 of the Maps accompanying Dublin County Council Development Plan 1983. Information provided by Mr. John Bird, Senior Planner, Fingal Co. Co.

The road improvement works were completed in 1992. As this study was undertaken in 1994, it was proposed to use 1993 as the study year to represent the period after the road improvement works had been completed. It was anticipated that short-term effects on property values, due to improved accessibility and perhaps decreases in environmental quality in some cases, would be evident.

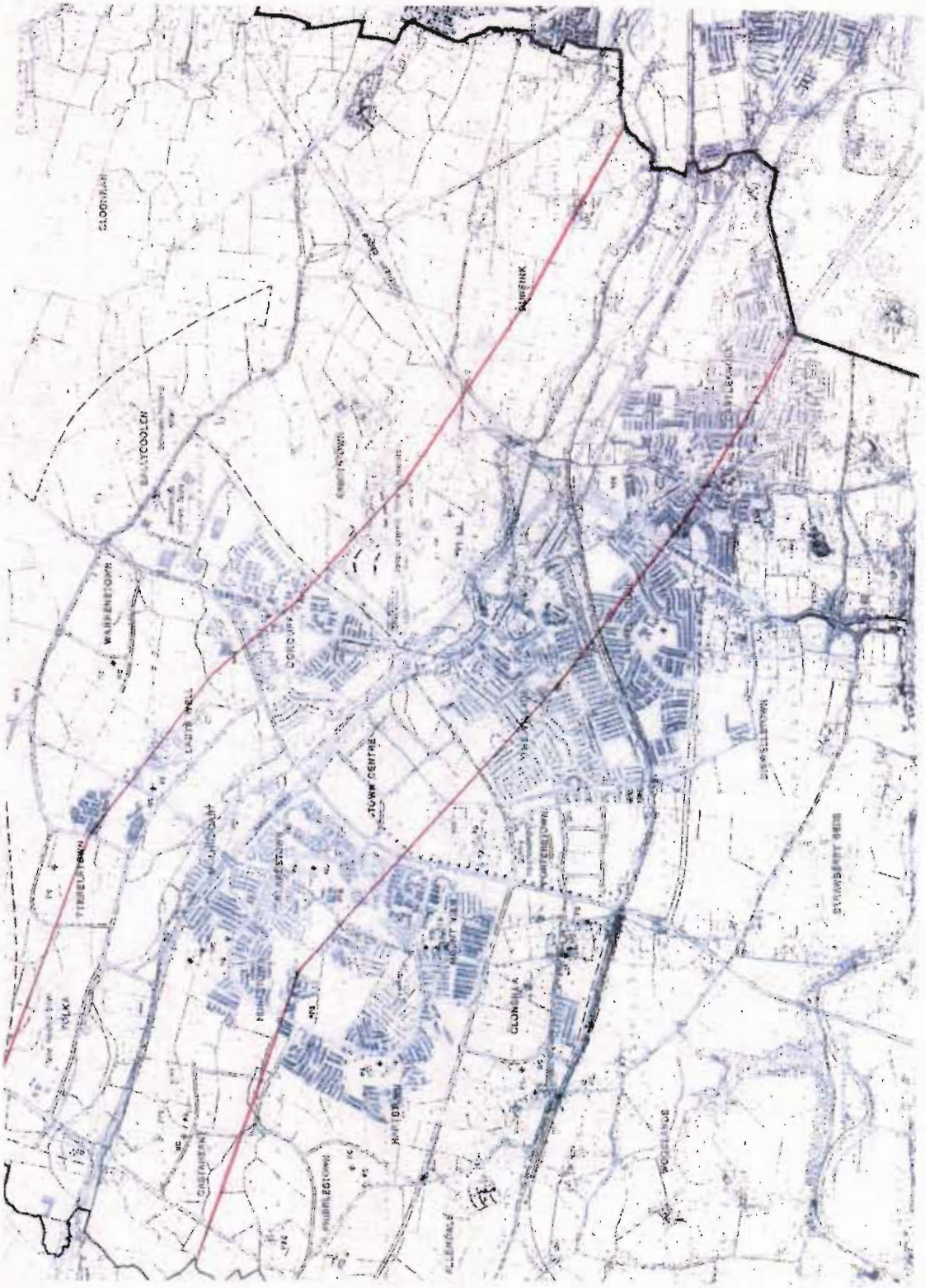
Therefore, the study years selected were 1980, 1987 and 1993.

Study Area

The stretch of the Navan Road which is the subject of this study is of 4.8 kilometres (3 miles) in length and runs from the Dublin City/ County Boundary at the Ashtown Roundabout to the Dublin County/ Meath County boundary where the Navan Road meets the Clonee By-Pass. The study area is effectively a corridor along the length of this stretch of road which extends to 0.8 kilometres (0.5 miles) on either side of the road, as illustrated on Figure No. A.4. The study area includes parts of Castleknock, Blanchardstown Village, Clonsilla, Abbotstown, Corduff, Blakestown, Mulhuddart, Huntstown, Lady's Well, Tyrrelstown, Tolka and Castaheany. The dominant land use in these areas is residential with some commercial land use concentrated around Blanchardstown village.

There are very distinct areas of private and public housing in the study area and very marked contrasts are evident in terms of the socio-economic profile of some of the neighbourhoods. Castleknock, would be considered as one of the wealthier suburbs of Dublin, whereas Corduff would be regarded as one of the poorer local authority housing areas in western Dublin. The literature on the hedonic pricing method advocates that an improvement in environmental quality positively affects property values in higher income areas more than poorer areas, as households in higher income areas are willing (and able) to

Figure A.4: Map illustrating the Study Area for the Navan Road Improvement Scheme Case Study



pay more for a given improvement in environmental quality; the opposite applies for a decrease in environmental quality. It was expected that the results of the hedonic pricing study would prove this supposition in the context of the Irish residential property market.

Data Set

It was proposed to carry out a separate hedonic pricing study for the residential and the commercial properties. The study on commercial property was dependant on amassing adequate sample sizes for retail, office and industrial properties from the letting transactions which took place within each study year, and on obtaining sufficient relevant details on each transaction. Depending on the information obtained, it was hoped that separate hedonic pricing equations could be developed for the retail, office and industrial properties for each of the study years. By estimating separate hedonic pricing equations for each year, it would remove the need to express the values in constant terms. In each of the hedonic pricing equations, it was likely that the dependant variable would be rental value; the independent variables would be the property characteristics and the locational and accessibility variables; and the variable under investigation would be improved accessibility which would be represented by travel time savings.

For each study year, separate hedonic pricing equations were to be developed for the various types of residential properties such as, semi-detached houses, detached houses, terraced houses, apartments and bungalows. Again, by doing this, the need to express the residential property data in constant terms was removed. For each of the hedonic pricing equations, the dependant variable would be property price; the independent variables would be the property characteristics, neighbourhood variables, locational and accessibility variables, and the rate of new residential development; and the variable under investigation would be environmental quality. As there can be only one variable under investigation in each hedonic

pricing equation, it was hoped that improved accessibility would be reflected in the locational and accessibility variables.

Travel Time Savings

Improved accessibility, represented by travel time savings, was the key variable under consideration in the hedonic pricing equations for the retail, office and industrial properties. Mr. Eoin MacNeill, the Senior Engineer in the Traffic Section of Fingal County Council provided data on average travel times regarding the Navan Road. The Traffic Section carried out a number of surveys on various dates to determine the average journey time, both westwards and eastwards, along the stretch of the Navan Road that was the subject of this study. The time taken to travel westwards by car between the swimming pool at St. Vincent's Home and the signpost for Clonee, near the Dublin/ Meath County boundary was calculated; and vice versa going eastwards. The surveys were carried out on four dates; two during construction, and two following completion of the Navan Road Improvement Scheme. For the surveys undertaken on the 29th May and the 13th June 1991, twelve car journeys, both westwards and eastwards, were carried out at approximately hourly intervals between 7.30 a.m. and 7.30 p.m.; whereas for the surveys undertaken on the 12th May and the 21st May 1992, twenty four car journeys, both westwards and eastwards, were undertaken at approximately half hour intervals between 7.00 a.m. and 6.45 p.m. Refer to Appendix No. 5 for detailed results of the surveys. The average time taken to complete the journeys on each of the four dates is detailed in Table A.14.

Table A.14: Results of Travel Time Survey (Westbound and Eastbound along the Navan Road)

Date	Average Time Taken to Travel Westbound (Minutes)	Standard Dev.	Average Time Taken to Travel Eastbound (Minutes)	Standard Dev.
29/05/91	17.05	2.51	15.31	1.58
13/06/91	16.31	2.25	15.08	1.15
12/05/92	8.14	0.13	8.16	0.15
21/05/92	8.12	0.25	8.02	0.18

Source: Information provided by Mr. Eoin MacNeill, Senior Engineer, Traffic Section, Fingal Co. Co.

From the above results, it is evident that the time taken to travel both westwards and eastwards along the Navan Road was practically halved between May/ June 1991 and May 1992. Also, the standard deviation for the surveys undertaken in 1992 were very low, indicating that there was very little variance in the time taken to complete the journey at different times of the day. This is evident from the detailed results contained in Appendix No. 5.

However, the author had grave reservations about including the results of these surveys in the statistical analysis, as the road improvement works were being undertaken when the surveys were carried out in May and June 1991; and therefore, it would be reasonable to assume that delays may have been encountered. For this reason, and also due to the fact that there was no data available on average travel times for any period prior to the road improvements taking place, the author decided that there was insufficient data available on travel time savings to include it as a key variable in the hedonic pricing equations for the commercial properties.

Environmental Variables

Environmental quality was the key variable under consideration in the hedonic pricing equations for the various types of residential properties. At the time that this study was undertaken, the Environmental Health Department of Fingal County Council only undertook tests to determine the levels of noise disturbance or air quality in a particular location when a complaint was received from an individual household. With reference to the Navan Road Improvement Scheme, no complaints were received with regard to air quality and only eight complaints were lodged by households regarding the excessive levels of noise generated by traffic on the Navan Road. All of these complaints were received in the year following the completion of the road.

Noise Pollution

Following complaints from the residents of eight residential properties located in close proximity to the road, the Environmental Health Officers carried out tests to measure the noise levels at each particular property. Noise levels at each property were recorded intermittently over an eighteen hour period and an average noise level was calculated from the results. Each of these tests were carried out on various dates over a three month period between August and October 1992, following completion of the road improvement works. The results of the tests are detailed in Table A.15.

Table A.15: Results of Noise Level Tests taken after the Navan Road Improvement Scheme was Completed

Date that Noise Level Test was Carried Out	Address of Residential Property	Average Noise Level Recorded dB(A)
25th August 1992	16 Phoenix Gardens, Castleknock	69.8 dB(A)
25th August 1992	49 Whitestown Crescent, Whitestown	62.3 dB(A)
25th August 1992	1 The Hill, Mulhuddart Wood, Mulhuddart	62.9 dB(A)
25th August 1992	3 Herbert Road, Blanchardstown	62.1 dB(A)
18th September 1992	Ivy Cottage/ Lane	66/ 67 dB(A)
8th October 1992	247 Navan Road	74.8 dB(A)
29th October 1992	377 Navan Road	74.0 dB(A)

Source: Mr. John Healy, Environmental Health Officer, Fingal Co. Co.

Walsh (1991)[46] states that as a general guideline, day-time noise limits within residential areas should be within 45-55 dB(A). If the residential area is suburban in nature and is located near busy roads or industry, Walsh states that the guideline could be revised to 50-60 dB(A). All eight of the households listed above experienced noise levels in excess of 60 dB(A). However, the environmental health officer claimed that there is only cause for concern once the noise level exceeds 68 dB(A). The noise levels measured at three of the above residential properties exceeded this level. Therefore, there was some evidence that excessive levels of noise disturbance were being experienced by the residents of some properties at various locations along the Navan Road. However, as no tests to measure the levels of noise were carried out prior to the Navan Road Improvement Scheme being undertaken, it could not

[46] Walsh, F. (1991), Environmental Noise Assessment, in Bradley, K., Skehan, C. & Walsh, G. (eds), *Environmental Impact Assessment - A Technical Approach*, DTPS Ltd. Environmental Publications, Dublin.

be conclusively stated that the improvement in the road had resulted in increased levels of noise disturbance.

Air Pollution

No tests to measure the levels of air quality (in terms of the levels of suspended particulates, oxidants or sulphate in the air) at various locations along the road were carried out by the Environmental Health Officers either before, during or after the construction of the Navan Road Improvement Scheme.

In conclusion, there was insufficient statistical data available on the levels of noise disturbance and air quality in order to include environmental quality as a key variable in the hedonic pricing equations for the various types of residential property.

Property Sales or Letting Details

It was proposed to examine back issues of the weekly property supplements of both the Irish Times and the Irish Independent newspapers for each of the study years 1980, 1987 and 1993 and for a six month period prior to each of these study years. This was deemed necessary as some of the sales or lettings of properties that were advertised within these six month periods may only have been completed in the study years under consideration.

Relevant details on all of the residential properties offered for sale and the commercial properties offered for letting within the study area were to be extracted from the newspaper advertisements. The estate agents who had advertised the properties were then to be contacted and requested to provide details on the sale or letting transaction. In the case of residential properties, details on the sale price and the sale date were required. For commercial properties, information on the letting value, lease terms and the letting date were required.

A number of the large estate agency practices such as Sherry Fitzgerald, Lisney, Gunnes, Hamilton Osborne King, Mason Estates, etc. were responsible for the majority of residential and commercial sales and lettings in the area. Therefore, the author anticipated that it would have been easier to have obtained details on the property transactions than had been the case in the Fruit of the Loom case study in Buncrana.

The task of extracting details from the newspaper advertisements was begun for the period July 1979 to December 1980, but was abandoned when the author realised that the information available relative to the travel time savings and the environmental variables were insufficient for the purposes of carrying out in-depth statistical analyses.

Variables Detailing Property Characteristics

The property characteristics that the author proposed to use in the hedonic pricing equations for the residential properties were similar to those selected for the Fruit of the Loom case study. They included:

- House Type (detached; semi-detached; terraced; apartment; bungalow)
- Total Floor Area
- Number of Bedrooms
- Presence of a Garage
- Plot Size
- Central Heating Type
- Number of Bathrooms
- Age
- Off-Street Car Parking
- Security Provisions
- Rear Access.

The property characteristics for inclusion in the hedonic pricing equations for the commercial properties depended on the type of property being analysed.

Some characteristics that may have been included were area (net internal area, gross internal area or gross external area); lease terms; frontage; car parking provisions; age of property; facilities; etc.

Again, it was proposed to input some of the above variables into the hedonic pricing equations as dummy variables for the reasons outlined in Section 5.2.7.

Neighbourhood Variables

Ward level data from the Census' was available for the Castleknock - Park ward and for the Abbotstown, Blakestown, Coolmine, Corduff, Delwood, Mulhuddart, Roselawn and Tyrrelstown wards within the Blanchardstown area for each of the Census years 1981, 1986 and 1991. For the hedonic pricing equations for the residential properties, it was proposed to extract statistics on the unemployment rate; socio-economic grouping; the rate of car ownership; and the proportion of young children and pensioners in the area from the ward level data for each area to represent the neighbourhood characteristics of that area.

Locational and Accessibility Variables

The author proposed to use the address of each property to identify it on an Ordnance Survey Map and then, to measure the distance of the property from various locations and facilities such as the Navan Road; the City Centre; Blanchardstown Village; the Western Parkway motorway; the nearest railway station; the railway line; the nearest gate into the Phoenix Park (either the Castleknock or the Ashtown Gate); and the site of the proposed town centre in Blanchardstown (now the Blanchardstown Shopping Centre and Retail Parks). Some of the above locations and facilities, such as distance from the city centre and the Western Parkway motorway, would have been included in the hedonic pricing equations for both the residential and commercial

properties; whereas others, such as distance from the Phoenix Park, would only have been included in the analysis of the residential properties.

In the case of the residential properties, it was anticipated that proximity to some of the above locations and facilities would have exerted a positive influence on property prices, such as proximity to the Phoenix Park. However, proximity to others, such as the railway line, may have positively or negatively affected property values depending on the location of the property. Being located close to a railway station would have been considered advantageous, but there would also be environmental disamenities, such as increased air and noise pollution, associated with being located in close proximity to the railway line. Likewise, proximity to the Navan Road may have been viewed both positively, because of increased travel time savings, and negatively, due to increased volumes of traffic with the resultant increased levels of noise and air pollution.

It would have been a very arduous task to measure the distance of the properties from the above locations or facilities by road distance, and therefore, it was proposed to measure distance as the crow flies. For the purposes of inputting the locational and accessibility variables into the hedonic pricing equations, it was proposed to express distance as being within a pre-determined range such as, less than 100 metres, 100 to a 400 metres and 400 to 800 metres.

Measure of the Rate of New Development

For the same reasons given for the inclusion of such a variable in the Fruit of the Loom case study, it was proposed to include a variable which would represent the rate of new development within the study area in the hedonic pricing equations for the residential properties. In an attempt to quantify the rate of development of new residential dwellings in the area, it was proposed to examine all the planning applications submitted during the year prior to each of the study years of 1980, 1987 and 1993 and to extract details on all

the new residential dwellings for which full planning permission or approval had been granted within these years. The planning permissions for the year before the study year were examined, as it was assumed that if planning permission or approval was granted for a residential development, that it would take at least a year for it to be constructed and to come on stream.

No problems obtaining access to the planning files containing details on the planning applications for residential developments within the study area which had been submitted to Dublin County Council in 1979, 1986 and 1992 were anticipated. Mr. Len O'Reilly, a planner with Dublin County Council, approved permission for the author to obtain access to the archive files for 1979 and 1986. However, as the case study was abandoned at an early stage, the author had not begun to extract information from the planning files.

Concluding Remarks on the Navan Road Case Study

After the problems that were encountered in the Fruit of the Loom case study, a different approach was adopted in researching this case study. Firstly, the author identified the necessary data requirements and established whether such data was readily available. Again, inaccessibility and lack of relevant data made this case study unworkable.

APPENDIX 4

APPENDIX 4

SHORT AND LONG TERM WEEKLY UNEMPLOYMENT ASSISTANCE RATES (URBAN AREA) 1984 - 1993

Year	Single Rate	Average	Married Rate	Average
1984 Short Term	£30.90	£31.85	£53.20	£54.83
1984 Long Term	£32.80		£56.45	
1985 Short Term	£32.75	£33.85	£56.40	£58.28
1985 Long Term	£34.95		£60.15	
1986 Short Term	£33.00	£34.25	£56.95	£59.13
1986 Long Term	£35.50		£61.30	
1987 Short Term	£34.00	£35.30	£58.70	£60.95
1987 Long Term	£36.60		£63.20	
1988 Short Term	£37.80	£39.25	£63.20	£65.65
1988 Long Term	£40.70		£68.10	
1989 Short Term	£42.00	£44.50	£68.90	£72.45
1989 Long Term	£47.00		£76.00	
1990 Short Term	£45.00	£48.50	£76.00	£79.50
1990 Long Term	£52.00		£83.00	
1991 Short Term	£50.00	£52.50	£83.00	£85.50
1991 Long Term	£55.00		£88.00	
1992 Short Term	£53.00	£55.10	£87.30	£89.40
1992 Long Term	£57.20		£91.50	
1993 Short Term	£55.60	£57.40	£91.50	£93.10
1993 Long Term	£59.20		£94.70	

Source: Mr. J. B. Doherty, Regional Manager for North County Donegal, Department of Social, Community and Family Affairs.

APPENDIX 5

APPENDIX 5

RESULTS OF TRAVEL TIME SURVEYS ON THE NAVAN ROAD

(Between the Swimming Pool at St. Vincent's Home and the Clonee Signpost)

Source: Mr. Eoin MacNeill, Senior Engineer, Traffic Section, Dublin Co. Co. (now Fingal County Council)

Date: 29/05/91

Weather: Good and sunny all day

Westbound		*Eastbound*	
Start Time	**Duration**	**Start Time**	**Duration**
7.20	13.54	7.45	16.25
8.05	14.03	8.45	18.01
9.10	15.11	9.45	14.51
10.05	15.48	10.45	18.04
11.05	16.52	11.45	15.09
12.05	18.37	12.45	14.52
14.00	17.32	14.25	16.53
15.00	21.49	15.25	13.06
16.00	18.54	16.30	18.13
17.00	16.04	17.30	14.44
18.00	22.14	18.30	13.11
19.00	14.05	19.30	12.52
Average	**17.05**	**Average**	**15.31**
Standard Dev.	**2.51**	**Standard Dev.**	**1.58**

Date: 13/06/91

Weather: Sunny with showers

Westbound		*Eastbound*	
Start Time	**Duration**	**Start Time**	**Duration**
7.30	13.01	7.45	14.25
8.00	16.17	8.45	15.31
9.05	21.59	9.45	15.03
10.05	14.05	10.45	15.25
11.05	17.08	11.45	14.53
12.05	18.43	12.45	14.21
14.00	14.41	14.30	17.55
15.00	15.57	15.30	16.17
16.00	16.43	16.30	15.53
17.00	16.51	17.30	15.11
18.00	18.26	18.30	13.25
19.00	14.32	19.30	13.17
Average	**16.31**	**Average**	**15.08**
Standard Dev.	**2.25**	**Standard Dev.**	**1.15**

Date: 12/05/92

Weather: Drizzle in the morning fine later

Westbound		*Eastbound*	
Start Time	**Duration**	**Start Time**	**Duration**
7.00	8.13	7.15	8.04
7.30	8.44	7.45	8.37
8.00	8.20	8.15	8.50
8.30	8.26	8.45	8.47
9.00	8.36	9.15	8.15
9.30	8.07	9.45	8.19
10.00	8.13	10.15	8.08
10.30	8.11	10.45	8.19
11.00	8.41	11.15	8.03
11.30	8.15	11.45	8.20
12.00	8.25	12.15	8.14
12.30	8.10	12.45	8.00
13.00	7.47	13.15	8.24
13.30	8.07	13.45	8.32
14.00	8.02	14.15	8.16
14.30	8.11	14.45	8.19
15.00	8.18	15.15	8.27
15.30	7.54	15.45	8.13
16.00	8.14	16.15	8.24
16.30	8.07	16.45	8.17
17.00	8.06	17.15	7.48
17.30	8.24	17.45	8.03
18.00	8.13	18.15	7.52
18.30	8.11	18.45	8.09
Average	**8.14**	**Average**	**8.16**
Standard Dev.	**0.13**	**Standard Dev.**	**0.15**

Date: 21/05/92

Weather: Drizzle in the morning fine later

Westbound		*Eastbound*	
Start Time	**Duration**	**Start Time**	**Duration**
7.00	7.55	7.15	7.52
7.30	7.51	7.45	7.58
8.00	8.10	8.15	8.31
8.30	8.12	8.45	8.25
9.00	8.08	9.15	8.17
9.30	8.29	9.45	8.05
10.00	8.01	10.15	7.52
10.30	8.10	10.45	7.50
11.00	8.14	11.15	8.15
11.30	7.53	11.45	8.08
12.00	9.41	12.15	7.49
12.30	8.13	12.45	7.47
13.00	8.11	13.15	7.36
13.30	8.08	13.45	8.37
14.00	8.10	14.15	8.02
14.30	8.18	14.45	8.18
15.00	8.07	15.15	7.37
15.30	7.29	15.45	8.20
16.00	7.53	16.15	7.42
16.30	8.48	16.45	8.01
17.00	8.42	17.15	7.57
17.30	8.29	17.45	8.21
18.00	8.10	18.15	8.08
18.30	7.49	18.45	7.28
Average	**8.12**	**Average**	**8.02**
Standard Dev.	**0.25**	**Standard Dev.**	**0.18**

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